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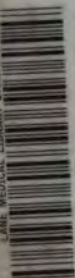
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REPORT

OF THE NEW YORK STATE CATTLE COMMISSIONERS,
IN CONNECTION WITH THE REPORT OF THE MET-
ROPOLITAN BOARD OF HEALTH, IN RELATION TO
THE TEXAS CATTLE DISEASE.

To the Legislature of the State of New York:

The Board of Commissioners, organized under "An act to prevent the introduction and spread of the disease known as the Rinderpest, and for the protection of the flocks and herds of sheep and cattle of this State from destruction by this and other infectious diseases," would respectfully present their report.

M. R. PATRICK,
LEWIS F. ALLEN,
JNO. STANTON GOULD,
45 Commissioners.

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REPORT OF THE NEW YORK STATE CATTLE COMMISSIONERS, FOR THE YEAR 1868.

To the Honorable the Legislature of the State of New York:

The Board of Commissioners, organized under "An act to prevent the introduction and spread of the disease known as the Rinderpest, and for the protection of the flocks and herds of sheep and cattle in this State from destruction by this and other infectious diseases," passed April 20, 1866 (chap. 740), and amended April 19, 1867 (chap. 453), respectfully

REPORT:

That the disease known as Rinderpest has not, since the date of their report for 1867, reappeared in the British Isles, or in any of those countries in Europe from which cattle are usually brought to the United States; and it is believed that, with the knowledge we now have of the disease itself, and of its treatment, its ravages would be speedily checked, should it, by any accident, enter our State.

The report of the Hon. A. B. Conger, of the State Agricultural Society, on the "Statistics, pathology and treatment of the epizootic disease known as Rinderpest," is an exceedingly valuable contribution to veterinary science, and its publication in the Transactions of the Society will very widely extend the knowledge of epizootic diseases, and their treatment, among the stock owners of New York State.

With the banishment of Rinderpest to its native steppes in Southern Russia and Hungary, all fears in regard to the safety of cattle in this country passed away, and a sense of security was felt by all engaged in breeding, feeding and handling stock.

FIRST APPEARANCE OF TEXAS CATTLE DISEASE.

About the 10th of June last, however, a disease appeared at Cairo, the southern terminus of the Illinois Central railroad, at the junction of the Ohio with the Mississippi river, where large numbers of cattle from Texas were being landed, and shipped thence by rail to the interior of Illinois and Indiana.

This disease was soon recognized as "Spanish fever," so called in the Gulf States, but better known in more Northern States as the "Texas cattle disease"—a scourge that had repeatedly crossed the Texan border and swept off immense numbers of cattle in Kansas and Missouri, previous to the late civil war, causing the enactment of prohibitory laws in those States, relative to the introduction of Texas cattle.

From Cairo the disease was conveyed along the railway lines into the interior of Illinois and Indiana, reaching the little town of Tolono, at the crossing of the Illinois Central and Toledo and Wabash railroads, about the 20th of July, and speedily sweeping away almost every native animal of the bovine race in that neighborhood—two hundred and thirty-five cows having died between that date and the first of August.

ITS RAVAGES IN ILLINOIS.

From fifteen thousand to eighteen thousand head of Texas cattle had been landed at Tolono, resulting in the estimated loss of five thousand head of native cattle in the county of Champaign alone,* while multitudes were dying in other parts of that State and Indiana; and stock destined to eastern markets had become diseased to such an extent, by the 5th of August, as to endanger the lives of meat consumers in the cities that draw their supplies of beef from the Western States.

METROPOLITAN BOARD OF HEALTH.

By the 8th of August it became apparent to the officers of the Metropolitan Board of Health in New York city, that the alarming increase of obstinate and fatal diarrhoeas in the metropolitan district, was caused by the use of diseased meats, and measures were instantly taken to arrest the evil. The action of the board, wise, energetic and far seeing, not only averted the calamity that threatened the city, but far beyond all this, by the rigid investigation it conducted in regard to the nature and character of the disease, large contributions have been made to sanitary science, generally, and certain great laws of hygiene established for the future.

ACTION OF THE STATE EXECUTIVE.

His Excellency Governor Fenton, after corresponding with the Governors of New Jersey and Pennsylvania, who co-operated with him in his efforts to check the progress of this fearful plague, summoned the Rinderpest Commission, as it was called, to meet him in Albany on the 17th of August, at the Executive chamber.

* See page 6, "Report of Delegates of Board of Agriculture, Province of Ontario."

ACTION OF THE STATE COMMISSION.

In obedience to the summons, the Commission met, and received from His Excellency all papers and correspondence that had come to him on the subject, with instructions to carry out the provisions of the acts of the Legislature establishing the Commission. On the 18th, Prof. Jacob W. Mosher, of the Albany Medical College, was placed in charge of the Albany district as Assistant Commissioner, with Mr. John Phillips as his assistant, at the drove yards; Dr. Moreau Morris, Sanitary Inspector of the Metropolitan Board of Health, was appointed Assistant Commissioner for the Metropolitan district, with instructions and authority to act as such along all the lines of travel leading to the city; and Dr. William Manlius Smith of Onondaga, was dispatched to Suspension Bridge, to prevent the introduction of diseased cattle through the province of Ontario, *via* the Great Western railway from Detroit and the Western States.

The city of Buffalo being cared for by its Board of Health, the stock yards were, temporarily, placed under its health officer, and the stations of Dunkirk and Jamestown provided for until they could be visited by the Commissioners.

A brief code of instructions, regulating the inspection of cattle at the stock yards, the transit of cattle through the State, the disinfection of cars, and quarantine of diseased animals, was drawn up by the Commission, and published generally throughout the State within the next three days. (A copy marked "A" is hereto appended.)

INSPECTION OF THE DEPOT, ETC., BY THE COMMISSIONERS.

On the 19th of August, the Commissioners separated, and made each a rapid survey of his own district, Commissioner Allen taking the Western, Gould the Eastern, and Patrick the Central district of the State, while Dr. John Swinburne, Health Officer of the Port of New York, was instructed by His Excellency to join the Commissioners in making a tour of the State, that his knowledge of the principles of quarantine might be made available in carrying out the regulations already published.

THE STOCK YARDS AT CAMPVILLE.

At Campville, on the Erie road, the disease had first appeared on the 9th of August, some eighteen or twenty head of Western cattle, taken from the cars on the previous day, having died within a few hours. They were buried in shallow trenches near the river, and into these same trenches, shortly after, were thrown the mangled remains of a large number of cattle, the debris of a railroad smash-up, some distance east of Campville.

Only a few inches of soil was thrown into the trenches, not even covering the animals from sight, and the weather being extremely hot, such a stench arose from that mass of corruption as threatened a pestilence, when Messrs. Swinburne and Patrick reached there on the morning of the 21st of August. They were soon after joined by Dr. J. G. Orton, of Binghamton, who had been previously directed by Gov. Fenton to visit that station, and who was immediately placed in charge of the district as Assistant Commissioner, with E. Van Tuyl as his assistant, at the Campville stock yards.

Under Dr. Orton's directions, the trenches were promptly covered with lime, and then with a heavy covering of earth, well sprinkled with carbolic acid, as found in the heavy oil of coal tar. All the yards, lanes and platforms about the premises were thoroughly disinfected by the use of the heavy oil.

The result of this process was almost instantaneous and perfect; no offensive effluvia afterward arose, and no case of disease has since appeared.

ELMIRA.

At Elmira, arrangements were made with Drs. Way, Squires and Chubbuck, city physicians, to act temporarily in case the disease should appear at that place, and Mr. G. E. Carpenter was appointed Assistant Commissioner for the district. As no case of Texas cattle disease has shown itself in that neighborhood, these gentlemen have not been called into service.

MEETING OF THE COMMISSIONERS AT BUFFALO.

By the night of the 22d (Saturday), the Commissioners were all gathered at Buffalo, Dr. Swinburne being among them. The mayor of the city, Gen. W. F. Rogers, the Board of Health, the railroad officers, and many prominent citizens of Buffalo, took an active interest in the business of the Commission, and on the 24th (Monday) a system of inspections, quarantine and disinfection had been perfected and put under the control of Dr. E. E. Mackay, Health Officer of the city, who was appointed Assistant Commissioner, with D. M. Josslyn as his assistant, at the extensive stock yards of the Central railroad.

As Buffalo is the principal gateway through which cattle enter the State from the West, and vast numbers are being landed there continually, rendering it necessary that a very rigid control should be exercised at that point, Commissioner Allen was specially charged with the supervision of that important depot.

SUSPENSION BRIDGE.

The Canadian authorities having, by an order of His Excellency the Governor General, in Council, prohibited the introduction of

horned cattle from the United States into the provinces of Quebec and Ontario, all danger of infection from the transportation of Western cattle over the Great Western railway, ceased, and Dr. Wm. M. Smith was withdrawn from Suspension Bridge, to take the place of medical adviser to the Commission, Dr. Swinburne being compelled, by his official duties as Health Officer of the Port, to return to New York.

DUNKIRK.

On the 25th, the Commission proceeded to Dunkirk, the western terminus of the Erie road, and there established such quarantine, inspection, and other regulations as appeared needful, appointing A. H. Abell, Esq., Assistant Commissioner, with Dr. Benedict as medical adviser, if his services should at any time be deemed necessary.

ERIE.

As no system of inspections, quarantine or other regulations in regard to diseased cattle had yet been promulgated in Pennsylvania, at the request of the Lake Shore railroad officers, the Commissioners extended their observations as far west as Erie, where they had an interview with Mr. Luce, the transportation agent of the Lake Shore road at that place. After a full understanding of the objects of the Commission, and an examination of the instructions and regulations issued to its own inspectors, Mr. Luce decided to adopt, as far as practicable, the same system at Erie; thus practically extending our own quarantine regulations some twenty-five miles beyond the limits of our own State.

JAMESTOWN.

As the Atlantic and Great Western railway, connecting with the Erie railway at Salamanca, affords a fourth gateway for cattle to enter the State from the West, the Commission visited Jamestown, and there established the same system of inspections, quarantine, etc., as at Dunkirk, and appointed Sardius Stewart, Esq., Assistant Commissioner for the Jamestown district.

Having thus established a system of inspection at every point where Western cattle enter the State, the Commission returned to Buffalo on the evening of the 27th of August, where they found several cattle in hospital yards, and had an opportunity to study the disease itself more fully than heretofore; for up to that time very few *facts* had been gathered as to its real nature.

THEORIES IN REGARD TO THE DISEASE.

Great numbers of Western drovers and stock dealers were examined as to their knowledge of its character and effects, resulting in

the enunciation of a multitude of theories, prominent among which were :

1. That no Texas cattle had ever been known to die, or be affected with the disease themselves, but were universally regarded as sound and healthy.

2. That by some mysterious agency, these healthy Texas cattle had, at various times within the last few years, infected the native cattle of the Western States with a fatal disease.

3. That native cattle, though sick and dying of the disease, could not impart it to other cattle.

4. That the meat of diseased animals had never been known to produce any ill results to the consumer, and might, therefore, be regarded as healthy food.

5. That with the first frosts of autumn, the disease entirely disappeared, and no infection could be conveyed thereafter by Texas cattle.

The facts, however, that came under the observation of the Commissioners, led them to discard these theories, though without, then, arriving at conclusions entirely satisfactory to themselves on the subject ; and on the 28th of August they adjourned, to meet again in New York city, on the 2d of September, there to make more thorough and accurate investigations.

MEETING OF THE COMMISSIONERS IN NEW YORK CITY.

Accordingly, on the 2d of September, Messrs. Patrick and Gould, with Dr. William Manlius Smith, met in New York, and were joined by Dr. Swinburne, Health Officer of the Port, Dr. Harris, Registrar of Vital Statistics of the Metropolitan Board of Health, and Dr. Moreau Morris, its Sanitary Inspector and Assistant Commissioner for the district. In consequence of the large number of cattle arriving at Buffalo, it was not deemed safe for Mr. Allen to leave that most exposed position at that time, and the other members of the Commission were obliged to go on without him.

Under the guidance of the officers of the Board of Health, a thorough survey of the whole field of operations was instituted, extending beyond the city limits and across the Hudson to the stock-yards and abattoirs on the Jersey side, which furnish meats to the New York markets. The "bone boiling" and "rendering" establishments were visited, to follow up condemned meats, and ascertain the final disposition made of them, as well as to become familiar with the various processes of disinfection in use at those places, where carcasses of dead animals, in every stage of putrefaction, were gathered from every part of the city.

METROPOLITAN BOARD OF HEALTH INSTITUTES INVESTIGATIONS.

Autopsies of animals dying of the Texas disease, were made by the officers of the Board of Health, at the drove yards of the Messrs. Allerton, and the results of these examinations recorded. A careful analysis of the various tissues, fluids and viscera of the animals was conducted by Prof. Chandler, of the School of Mines, Columbia College, chemist of the Board, while the same structures were subjected to the scrutiny of Prof. Stiles, of Brooklyn, microscopist of the Board. Bringing his skill and large experience to the work, Prof. Stiles soon unmasked the mysterious and active agent in this disease, revealing not only its perfect outline and form, under the microscope, but with equal distinctness exhibiting the mode of its attack upon the blood discs, and the entire destruction of the blood that resulted from it. One of the most brilliant discoveries in medical science, but not more brilliant than useful.

RESULTS OF OBSERVATIONS.

As the result of their observations in New York, the Commission drew up the paper marked "B" (appended hereto), and caused it to be published in the leading papers throughout the State.

Notwithstanding the utmost caution and watchfulness at Buffalo, and other places of inspection, diseased cattle often reached New York city until quite late in the season, and the Commissioners were frequently called to look at cattle in different localities, and affected with various ailments, but which, in the excited state of the public mind, were supposed to be cases of real Texas disease.

WESTERN COMMISSIONERS SENT TO NEW YORK.

As was expected, the inspection and quarantine regulations established at Buffalo and other railway depots, created great consternation in the western cattle dealing States, and caused His Excellency Governor Oglesby, of Illinois, to appoint a special commission with instructions to visit New York, for the purpose of conferring with Governor Fenton and the New York Commission as to the best means of regulating the shipment of cattle to Eastern markets, so as to embarrass the trade as little as possible, while protecting the health of our citizens and guarding their herds from infection. (See paper marked "C," hereto appended.)

An examination of the workings of the system adopted in this State proved satisfactory to the Illinois Commissioners, and a request was made by them, that a call should be issued by the Governor of the State of New York, for a convention of commissioners from all the States interested in breeding, feeding, handling and shipping cattle as well as from the Eastern consuming States, where cattle are marketed.

CALL FOR A CONVENTION OF CATTLE COMMISSIONERS.

In this request Illinois was joined by other Western States and Canada, resulting in the issue of a circular from the Executive Chamber in Albany, calling such convention to meet at the city of Springfield, Illinois, on the 1st day of December, 1868. (See paper marked "E.")

As the subjects to be discussed in that Convention involved questions of vital importance to the citizens of this State, it was essential that this Commission should be thoroughly prepared to meet them understandingly, and be able to bring *facts* before the Convention, in opposition to the interested statements of dealers in Texas cattle, and the numberless theories set afloat in regard to the character and effects of the disease, by persons who had never thoroughly investigated the subject.

NEW YORK STATE COMMISSIONERS AND METROPOLITAN BOARD OF HEALTH.

Accordingly, after having met and conferred with the commissioners of the province of Ontario, who had but just returned from an extended tour of observation in the West, the New York Commissioners assembled at the rooms of the Metropolitan Board of Health, in the city of New York, on the 2d day of November, and were permitted to avail themselves of the results derived from all the scientific investigations that had been going on since the 8th of August, as well as all the data gathered by Dr. Harris, the Registrar of the Board, in the course of his widely extended correspondence, and the mass of facts gathered by Assistant Commissioner Morris and his associate inspectors of the Board of Health, during the prevalence of the disease.

Every stock-yard, abattoir, slaughter-house, rendering and bone-boiling establishment of the metropolitan district, was made the subject of investigation, and all classes of disease affecting ruminants (and to some extent swine), came under the observation of the Commission, revealing such an amount of reckless barbarity toward animals, and of criminal indifference to the public health, on the part of many who furnish meat to consumers, that one almost wonders how the city has escaped a pestilence.

It is to be hoped that some of these terrible nuisances will soon be abated by law, and that all animals for slaughter will be taken to the great abattoirs of Communipaw, East Forty-fourth street, and the like, where the meat can be inspected by a proper officer, and everything condemned be conveyed speedily to such rendering dock as that of West Thirty-eight street, where steam and carbolic acid effectually destroys all offensive odors.

DR. MORRIS TO REPRESENT THE METROPOLITAN BOARD OF HEALTH AT
SPRINGFIELD CONVENTION.

As it was of much importance that some competent medical gentleman, who had been personally acquainted with the disease as it developed in New York, should be present at the Convention in Springfield, the Board of Health very kindly authorized its Sanitary Inspector (and our Assistant Commissioner), Dr. Moreau Morris, who, more perhaps than any other individual in the city, had come in contact with infected and diseased cattle, to accompany the State Commissioners to the Convention.

TEXAS DISEASE IN ORANGE COUNTY.

A question of great interest in connection with the spread of this infection, had been settled, by facts, only the week previous to the meeting of the Commission in New York. On the 20th of October, Commissioner Gould had been called to Hamptonburgh, in the milk district of Orange county, to ascertain the cause of a number of sudden deaths among the cattle in that neighborhood. Dr. Morris was eventually summoned from New York, and on the 24th October, with Mr. Gould and Dr. Montfort, Assistant Commissioner, made a post-mortem examination of two heifers, found dead on that day, and these were followed by the post-mortem examination of a cow on the 27th, by Dr. Montfort. From all the facts elicited during these investigations, and from the autopsies of the animals, not a doubt was left on the minds of these gentlemen that they had died of genuine Texas cattle disease; and further, that this disease had been introduced into that neighborhood by a herd of *native cows* brought from Painesville, Ohio, on the Lake Shore railroad, over which large numbers of Texas cattle had been passing. [Commissioner Gould's instructions to farmers, marked "E," are hereto annexed.]

As it had been almost universally assumed in the West, that *Texas cattle, only*, could communicate the disease, an important question was settled at Hamptonburgh.

AUTOPSIES OF TEXAS BULLOCKS AT BUFFALO.

Again: It had been announced by stock dealers as an undeniable fact, that, although Texas cattle might give the disease to native cattle, they were never affected by it themselves. Yet at Buffalo, on the 24th of November, the Commissioners found two Texas steers (taken on the previous day from a herd directly from Kansas) in a dying condition; and, on being slaughtered, presented every characteristic feature of the genuine Texas cattle disease in its most

intensified form ; and this, too, in very cold weather, after nearly two months of frost—establishing beyond all cavil the fact, that Texas cattle may die of the disease, and that, in freezing cold weather.

A TEXAS HERD AT LAFAYETTE, INDIANA.

While on their way to Springfield, the Commissioners sought information from all sources ; and at Lafayette, Indiana, spent a day in the slaughtering establishments of Sample & Son, where a herd of one hundred and forty-two Texas cattle were being slaughtered for packing. These animals appeared to be in perfect health, presenting no external symptoms of any disease, and the meat, except in a single instance, appeared to be of good quality ; yet the viscera of large numbers of these animals, taken indiscriminately from the herd, exhibited *in every instance* the unmistakable scars which that disease invariably leaves upon the coats of the stomach.

So evident did it appear to the Commission that Texas cattle, as a class, were all, more or less, at some time affected by this peculiar disease, which invariably left upon the coats of the stomach an ineffaceable and characteristic mark, that Texas cattle dealers in Springfield were permitted to select one of the best Texas bullocks, from the best Texas herd of the season, and have it slaughtered, to test the question.

EXAMINATION OF THE STOMACHS OF A TEXAS STEER AND NATIVE COW, AT SPRINGFIELD, ILL.

On the morning of the 1st of December, in the presence of a large number of gentlemen of the Convention, and cattle men generally, the selected animal was slaughtered, and presented such palpable evidences of former disease as to convince the most skeptical. To meet the assertion, "That all animals grazed on Western prairies presented the same appearance of scars upon the stomach," a fat native cow was knocked down, and, on being opened, the stomach exhibited a perfectly smooth, clean and healthy appearance, entirely different from that of the Texas animal lying by its side.

The record of disease written upon the viscera of the Texas animals, so distinct and perfect as to be seen of all men, had much influence in settling the opinion of Commissioners who had already assembled from most of the States, so that, when the Convention organized, much useless debate upon exploded theories was avoided.

MEETING OF THE CONVENTION.

The Convention met in the Hall of Representatives at 12 M., on Tuesday, the 1st day of December, and proceeded to business. Hon. Lewis F. Allen, of the New York Commission, was chosen President

of the Convention, which continued its sitting until Thursday, the 3d, when it adjourned.

As a very full copy of its proceedings are published under the direction of His Excellency Governor Oglesby, it will not be necessary in this report to speak of them in detail.

A mass of facts and general information in regard to the cattle trade of the West were elicited during the discussions, which were of great value to the New York Commission, and those from States on the Eastern seaboard.

The results of the series of investigations conducted by the Metropolitan Board of Health, were presented to the Convention by Dr. Morris, and attracted marked attention; especially certain plates and drawings illustrating the appearance of diseased matter under the microscope, and the various developments of cryptogamic growth in the blood and other fluids of diseased animals.

RESOLUTIONS.

Resolutions were adopted by the Convention, recommending to the Legislatures of the several States interested, the enactment of uniform laws, regulating the times for introducing Texas cattle into their respective States; the driving, shipping, feeding and transportation of cattle designed for market; instituting a system of inspection along the routes of cattle transit, and providing suitable penalties for persons diffusing dangerous diseases from animals in their possession.

MEMORIAL TO CONGRESS.

The Convention also appointed a committee to present a memorial to Congress, asking for a small appropriation, to be expended under the direction of the War Department, in following up the disease to the pastures of Texas, and with the data obtained already, identify the fungus parasite which is always found associated with the disease, and is the probable cause of it.

It is believed by your Commissioners, that, with the knowledge already possessed by the scientific corps of the army, of the Flora and Fauna of the regions traversed by the Texas herds, and with the facilities they possess for carrying out these investigations, the object can be far more speedily, thoroughly, and economically effected than by the appointment of a civil commission, which must, after all, be largely dependent upon the War Department for assistance and protection.

VISIT QUINCY AND ST. LOUIS.

It was, in part, to gain an opportunity of conferring with the Lieutenant-General, and other officers of the army, on this subject, that

the Commission, on leaving Springfield, accepted an invitation from the Missouri delegation to visit St. Louis. Since meeting the army officers at St. Louis, no doubt is left in the minds of the Commissioners as to the success of an investigation conducted under the direction of the War Department.

Another, and the main object of the Commission in extending their trip to the Mississippi, was to gain from personal observation and reliable data, correct information in regard to the magnitude of the Western cattle trade, and the *modus operandi* of feeding, handling and shipping cattle, as well as their treatment *en route* for Eastern markets. At Quincy, much interesting information was obtained.

At St. Louis, through the kindness of gentlemen connected with the Board of Trade and the Board of Health, as well as of other business gentlemen of the city, the Commission had access to all the feeding grounds, stock yards, slaughtering establishments, packing-houses and sale yards of the city and suburbs, and were furnished with a mass of statistics, of an exceedingly valuable character, as illustrating this trade.

EXTENT AND DEVELOPMENT OF THE CATTLE TRADE.

Formerly, say fifty years ago, the States east of the Alleghany mountains reared the meats consumed by their own population. They also reared and fattened much for exportation. As our foreign and internal commerce increased, and manufactures of various kinds sprung into existence, the soil was needed for the necessary production of grains, roots, fruits and other human edibles. The new States of the West increased in their herds of cattle, sheep and swine. They were driven on foot over the mountains, and found ready markets in those States which could no longer be supplied from their own soils.

For many years past, meat-growing in the seaboard States has become unprofitable, and our almost sole dependence for that indispensable article is now from the broad grass and corn-growing regions south and west of our great lakes, and extending even beyond the Mississippi.

The amount of our consumption is astonishingly large. New York city and its immediate vicinity now consume, directly and indirectly, about 7,000 beef cattle weekly, making an aggregate of more than 350,000 per year, valued at present prices at about \$35,000,000. In addition to these, about 65,000 calves arrive in the city, which may be valued at eight dollars each, amounting to \$520,000; about 700,000 swine, worth \$10,000,000; 1,200,000 sheep, worth \$5,000,000, amounting in the aggregate, striking off fractions, to the round sum of \$50,000,000. All this is aside from the vast quantities of salted

meats of beef and pork, which are also brought in and consumed in their cured conditions.

A great majority of these live stock enter the State of New York by the railroads from Western States leading to Suspension Bridge at the Niagara river, and Buffalo, and by the Atlantic and Great Western road through Jamestown, in the county of Chautauqua, which connects with the Erie railway at Salamanca, in the county of Cattaraugus. The Erie railway also receives many at Dunkirk, in the county of Chautauqua, from the Lake Shore road, and also at Buffalo, whence they are directly transported to New York. The cattle arriving at Suspension Bridge and at Buffalo are transported over the Central railroad direct to Albany. Then a portion of them are distributed over various railways into New England, but the bulk of them are shipped over the Hudson river and Harlem roads direct to New York, their final destination. A very considerable number of cattle are also shipped from the Western States by the way of Pittsburg, through Pennsylvania and New Jersey, and arrive at Jersey City and the Communipaw cattle yards, opposite New York, and make a portion of the consumption of the city and its environs.

The journeys which these cattle make, according to the locality from which they are removed, occupy a distance of eight hundred to fifteen hundred miles by direct railway communication, taking from six to fifteen days in the time of transit, with the stoppages for feeding, water, and rest included. The cattle trains move at the rate of about two to three hundred miles in twenty-four hours; but frequently from detentions, delays, and unavoidable accidents, they are delayed between their proper feeding places to thirty, or even forty hours. At an average, the feeding stations, where they can be taken out and fed, rested and watered, may be about two hundred and fifty to three hundred miles apart, but governed somewhat by the intersections and connections of different roads, as they diverge from or come into a main line running eastward, which embrace the traffic.

WHERE OUR BEEF CATTLE COME FROM.

The sources of supply previous to the last three or four years have been principally from the States west of the Alleghany mountains and north of the Ohio river, with the exception of a considerable number from Kentucky and Missouri. They are composed of native stock mainly, with more or less admixtures of foreign blood, chiefly of the short-horn breed, many years ago introduced into our country from England, and to some extent other improved English varieties, all which have improved the quantity and value of our native herds.

These cattle have usually been healthy, both in their native localities and on their way to and arrival at our markets.

Their usual condition, on their native feeding grounds, and in their various homes, on their removals for grazing and fattening (for they are a commodity of frequent sale and purchase among the breeders, graziers and feeders, who fit them in various stages for market), is generally healthy. Their pastures are good, and their feed usually abundant. Of consequence, when kept from adverse influences by local disease, which is quite unfrequent, they are in good condition when starting for market. No diseases prejudicial to their flesh, or adverse to affording good meats to the consumer, have affected them, as a rule, when properly and honestly handled, and our people have eaten freely of their flesh without fear of evil consequences.

THE TEXAN CATTLE.

But another and a widely different source of supply, within the last eight or ten years, has opened. For a few years previous to the late civil war, some droves of cattle were brought into south-western Missouri, which found their way through the Indian territory west of the State of Arkansas. They were comparatively few in number, and attracted little attention, other than that they were known to bring with them a peculiar local disease, which, under certain circumstances of exposure, hardship and abusive driving, they imparted to the native cattle of that then far distant region of Missouri.

The rebellion at the South put an end, temporarily, to that recently opened traffic, and from that prolific source of supply the Southern armies were mainly fed while they held possession of portions of the lower Mississippi; and when the Northern armies gained possession, the outlet for them being cut off, and no hostile invasion occurring in that distant State, their herds increased in great numbers.

WHAT ARE TEXAN CATTLE?

They are the descendants of the Spanish herds introduced into Mexico in the sixteenth century, soon after the conquest of that country by the Spaniards. In that country of wide savannas and abounding herbage, with continuous green foilage throughout the year, they increased, multiplied and spread over the whole territory with a fecundity unparalleled in all previous histories of their race. Every Mexican State and appendage where settlements prevailed, whether occupied by Spaniard or Indian, were ranged over and grazed by these numerous herds. They composed the chief wealth of the sparsely settled population, and were mainly valued for their hides and tallow, which became large articles of export. Their flesh

was a secondary object, and of little value. Texas, when admitted into the United States, was full of them, and they soon became the chief sources of beef supply to New Orleans and the other cities and towns on the Gulf and Lower Mississippi.

CHARACTER AND PROPERTIES OF TEXAN CATTLE.

In stature, they are medium, coarse and sleazily built, with large bone and horn; they are but moderately fleshed, and that flesh, in its natural wild condition, when compared with our own good native beef, is coarse, flabby and stringy. Savage and semi-wild in habit, they come into domestication reluctantly; yet, in many instances, when well tended and fed on our best pastures, and "finished off" on corn, after the manner of our good graziers and feeders, they yield a passable carcass of beef, but at more expense of food than those reared and fed in our own States. They mature tardily, at a not less age than five, six, or seven years, and at such ages, their live weight, in good condition, ranges from nine to twelve hundred pounds when brought to market.

THEIR MODE OF REARING AND TREATMENT.

They are owned in Texas, in large herds, ranging from a hundred to several thousand, in the hands of a single individual. No fenced pastures inclose them, and they range over the country in multitudinous droves, for many miles away from their owners' localities, all sexes and ages running together. One man may own a thousand head or more, and his only personal property aside from them, may be a few semi-wild horses, a little household tackle, his shooting and cutting irons, and a raw-hide tent or log cabin, where he lives and rears his family.

Running wild, the cows drop their calves at all seasons of the year, and rear them as best they may, in their own wild and vagrant manner. At a certain season annually, the several owners turn out, hunt, and collect their cattle from their various ranging grounds and drive them into inclosures made for the purpose — each one of a year old and upward having the brand or mark of their owner upon them. Here the calves are selected and branded with their several owners' marks or initials, the males castrated, those selected for driving away and selling taken out and retained, and the rest turned out again for grazing. Such is their rearing and treatment.

DRIVING, TRANSPORTATION, AND SELLING.

When collecting for sale and a market, those selected and fit for the purpose, mostly steers and cows, are separated from the main herds (each owner knowing his own brand — and it is but justice to

say that they are scrupulous in acknowledging among each other that mark of ownership), and strictly guarded by the drovers from getting back into the main herds. When ready for a start, they are then hurried out from their accustomed ranges into new grounds on their way to market. In many cases they are inhumanly driven, without sufficient food or water.

WHEN INTENDED TO GO ON SHIPBOARD.

On arriving at the landing places of the steamboats on the Gulf, or Mississippi and its tributary waters, they are rushed on to boats in the most brutal manner. When refusing, by fright or terror, to go on board quietly, they are lassoed by the horns, necks, or legs, as chance or opportunity may offer, and hauled on the decks, where they are crowded into the closest possible space, and securely railed in from escape. There the poor suffering beasts remain, tortured by hunger and thirst for several days together, with nothing to eat and no opportunity to drink, from their huddled condition, although a sea of water may be all around them, until they are taken to their destination on the rivers several hundred miles above, or below, and landed.

Those destined for immediate slaughter in the lower cities, on landing go immediately to the slaughter-houses, or may be fed for a few days in yards until marketed. Those intended for grazing in eastern Missouri, Kentucky, Iowa, or Illinois, go to the readiest landings on the Mississippi, or Ohio, and are there taken off and driven, or put in railway cars for transportation to the interior. We have been told on credible authority, that as many as eleven hundred head had been crowded and transported on a single steamboat to St. Louis, and perhaps nearly equal numbers on a single boat to Cairo, at the mouth of the Ohio. In this wretched condition at landing, many of them are found dead; others are terribly bruised and mutilated from crowding, and getting down and trampled upon by the others while on the boat — so much so as to be thrown overboard, or put aside from driving, or car transportation at all. Those able to be put on the cars are then, without food, in many instances, transported two hundred and twenty-eight miles — sometimes occupying two or three days on the journey, without food or water — to Tolono, the principal distributing point, where they are disembarked from the cars, and driven to their feeding or pasturing grounds.

To say that these poor, abused, emaciated cattle, having lived for a week, or ten or twelve days, without food or water, or with so trifling an amount of either as only to tantalize their existence into the desperation of misery and torture, with their systems

relaxed almost to a state of collapse, can be healthy, is to assert a fact utterly inconsistent with the laws of either health or animal physiology. The normal causes of disease — elsewhere discussed — existing within them, become active, and, when ranging with the native cattle with which they come into contact, they impart the disease to them, or leave it by the *spores* of their excrements on the cars and on the roads, in the streams, or the pastures and grasses over which they pass, to be imbibed or drawn in by the animals which follow them. Such is the condition and treatment of a large proportion of the Texan cattle which come into the upper States by boat transportation on the Mississippi.

INLAND MOVEMENTS OF THE TEXAN CATTLE.

Gathered into their several herds for driving northward, from the central portions of Texas, they are rapidly hurried forward, sometimes, as we are informed, at the rate of more than forty miles a day on their first starting — they are driven through upper Texas and across the Indian territory west of the State of Arkansas, grazing on the upper prairies and wooden ranges by the way into Kansas, to a station called Abilene, in the central part of Kansas, one hundred and sixty-three miles west of Leavenworth. The journey to Abilene may be from five hundred to eight hundred miles, according to the parts of Texas from which they first started. Abilene is now the great point of arrival for cattle from the interior of Texas. Here have recently been built large yard accommodations for their collection, sale and purchase as they arrive; and immense numbers, sometimes as high as twenty-five to fifty thousand in number, are pastured and herded in the vicinity, awaiting a market. Here they are bought by the large cattle dealers of the States east, and driven or “carried” forward to their various places of destination for feeding. They usually arrive at Abilene in a moderate condition of flesh — some better, or worse than others, as they have been driven, fed and watered by the way. They remain in the vicinity of Abilene sometimes for weeks and months, as purchasers may arrive from the East, or as the condition of the cattle may need recruiting for sale. As the land is mostly prairie, with abundant grasses growing, and mainly unsettled, pasturage costs little or nothing. They only require herding, which is cheaply done by their owners.

These cattle are bought in Texas for six to eight dollars a head, and their entire cost on arriving at Abilene does not exceed ten to twelve dollars each, thus establishing the foundation for

"CHEAP BEEF."

Here lies the solution of the grand question, why such comparatively inferior animals as the Texan cattle have been introduced into the wide cattle breeding and grazing regions of our Northwestern States. That they are "cheap" in every signification of the word, is certain. They bring the same *seeds* of disease with them to Abilene, as do the more southern herds which come up the river to Cairo and St. Louis, and under like circumstances impart it as readily to our native stock as they.* But allowing that quite a percentage of them die by abuse, and their own native disease, still, the wide margin of the whole cost left on the survivors, below the values of the native cattle of the Northwestern States, gives the "handlers" of them a large profit.

The losses suffered by the owners of native stock, which the Texan cattle have imparted to them, have been very heavy, and could they be thrown upon the owners of the Texans, the question of "cheapness" in their original cost, and the expense of "handling" them, might prove altogether a different matter.

What the proportionate number of Texan cattle, which reach our markets, may be to the natives, is difficult to say; and how much their considerable numbers may reduce the price of beef at our seaboard cities, if they were not available, is simply a matter of conjecture.

There are two distinct parties to the policy of using Texan cattle. It can be proved, by credible witnesses, among the graziers and drovers, in a court of justice, that the Texans are a profitable, useful and valuable class of beef-making material to our Western graziers and farmers; and it can be equally well proved by other witnesses, in the same occupation, that they are a scourge and a curse to the country, and that it is a calamity that they were ever introduced, and will remain a calamity so long as they are suffered to enter our States.

These are questions which we need not argue. They who purchase, feed and handle them, say their flesh is good, palatable and healthy to the consumer. When it is conceded by good physiologists that a coarse, raw-boned and streaked fleshed, six or seven years old beast of any kind, is equal in tenderness, juiciness, flavor and nutritive quality to a well constituted, small-boned, nicely fattened one of three or four years, and the general sentiment of the beef-

* It is, perhaps, proper to say that, from all the recent evidence gathered by the Commission, there can be no doubt that a much larger proportion of those Texas animals that come north by the Cairo and Mississippi route, are badly diseased, than of those which are brought by the Kansas and Abilene route.

consuming population concur in it, the question will be settled in favor of the Texans, and we fancy not until then. The fact of disease existing among the Texans, left out, would do much in their favor. But that fact admitted, sound policy, and a due regard to the sanitary condition of our population, may well interfere with the decision; and the sanitary question is probably the only one with which our State Legislature has a right to interfere.

REGULATIONS ATTENDING THE TRANSPORTATION OF CATTLE IN THE STATE
OF NEW YORK.

This is a question out of our own State, either way, with which we have nothing to do, and can only allude to it as touching our government in the matter. As a *sanitary* measure, we take it that the Legislature has entire control over it. A statement of the facts regarding the cattle transportation through the State will explain.

In the first place, *the great lines of railway running from the western line of the State to Albany and New York, appear to have done and are doing all in their power to accommodate the cattle traffic, both for the public and the owners of stock to the best advantage.* The New York Central railroad, at its cattle station at Suspension Bridge, where it receives its stock *via* the Great Western, through Western Canada, or Ontario, from the Michigan Central road, has capacious and excellent yards, with good supplies of forage and water, where cattle and other stock are yarded, fed, watered, rested and shipped into their own cars for Albany.

At Buffalo, this road has also extensive yards, of the most commodious character, fenced, paved and sheltered, with abundant provisions of forage and water, where the stock is received from the Lake Shore and Canadian Grand Trunk roads, and treated as at Suspension Bridge, and again shipped into their own cars for Albany. We hear of no abuses in the cattle transportation on either branch of this road.

The Erie railway now receives the chief part of its stock for transportation, which comes in over the Lake Shore road, at the yards of the Central road in Buffalo, although we understand it contemplates erecting commodious yards, of its own, contiguous to the Central yards, on land which it now owns. It also receives a portion of its stock at Dunkirk, the western terminus of the road, and also at Salamanca, four hundred and fifteen miles west of New York, from the Atlantic and Great Western road. Here, we understand, it takes the stock cars from the latter road, as they arrive, and runs them to Campville, half way the whole distance between Jersey City and Dunkirk, two hundred and thirty miles. At Campville, all their stock are *intended* to be transhipped, fed and watered for

the remainder of the journey, although some of it is hurried through without either.

The Atlantic and Great Western road enters the State of New York at its western line, about fifty miles west of Salamanca. How far its stock-feeding place is west of here, we are not informed, but at Jamestown, thirty-four miles west of Salamanca, we learn that portions of its stock are put off the cars, yarded, fed and watered. They are again taken aboard, and proceed to New York by the Erie road, from Salamanca.

The Lake Shore road brings the great bulk of the stock from the West, and delivers it to the Erie and Central roads at Dunkirk and Buffalo, as before stated. Thus it will be seen, that when stock arrives from States west of New York, our own roads are prepared to receive and treat it in a proper manner, and were there no further difficulties connected with the traffic, our people, or Legislature, would have little to do in the matter of regulating the transportation. But stock of all kinds intended for slaughter arrive at our Western cattle yards in all possible conditions and circumstances.

THE DROVERS, CATTLE OWNERS, AND DEALERS.

These are a numerous, and, in the aggregate, an active, influential class of men, embodying great business experience, frequently of large wealth, making extensive transactions, handling great amounts of money, and usually fair in their dealings. Their homes are on all the lines of railway, and frequently off from them, extending from Maine, and Boston, and New York city, to Kansas. They are alert in movement, quick in bargains, and bold in their operations. Their business is usually profitable, but sometimes the reverse. They consider their word as good as their bond, which it should be, as heavy amounts of property frequently change hands among them, with nothing but a slight written memorandum, or a witness called at the moment to attest their bargains. Detected in an unfair or under-hand transaction, they quickly lose caste, and are ruled out of the circle of fair dealing. Many among them, in the chief Western cattle States, are large breeders, graziers and feeders of stock, and they embrace bankers, merchants, lawyers, and men of almost every profession connected with the ownership of land and capital. Their individual transactions amount, in the aggregate, from a few thousand to more than a million or more of dollars annually. One cattle dealer, Mr. Alexander, alone, for the year ending May 1st, 1868, sent to New York market about 40,000 cattle. About 9,000 of them were fatted on his own farms, which consist of some 45,000 acres in one body in the county of Champaign, Illinois, and 31,000 head were purchased of other farmers and dealers. The value of these cattle in

New York, including cost at home, and transportation, was about \$115 each, making in the aggregate, \$4,600,500; and his business for the current year will exceed that of the last about twenty per cent. These cattle all, or nearly all, pass over the Pennsylvania and New Jersey railways to Jersey City.

Chicago, Toledo, Buffalo and Albany are the chief *way* cattle markets on the great routes to New York and the New England States, where dealers and drovers congregate in large numbers for sale and purchase; so that, in frequent cases, cattle change owners two or three times after their shipment before reaching their final destination.

In justice to a great majority of the drovers, we take pleasure in remarking that they are careful of their stock in transportation, liberate them from the cars at proper points, and care for their health and welfare by food, water and rest, so that they arrive at market in good condition.

Yet, it must also be remarked, there is another class of drovers and dealers, trading chiefly in the inferior and cheaper classes of cattle, who pay little regard to the impulses of humanity, and *run* their cattle through to market from their distant Western shipping points on the cars, in the most cruel and merciless way, for three, five, or even more days and nights together, as the case may be, with little, if any, food, water or rest on the route. In such cases the poor suffering animals become jaded with fatigue, almost famished with hunger and thirst, and lose much flesh. In frequent instances they become diseased, or falling down in the cars and tramped on by the others, arrive in a most pitiable condition of bruises, sometimes broken limbs and utterly disordered condition. Cattle apparently well at the time of their shipment, or having incipient ailment only, frequently have disease break out among them which is only discovered at the transshipping or car-changing points, when they are unable to go further. At these points, usually Chicago, Buffalo or Albany, a class of "shyster" butchers congregate on the chief cattle-arriving days, who buy these maimed, bruised and diseased animals, drive them slyly away, slaughter and cut them up, taking out the bruised or diseased parts, and sell them in the meat markets and stalls to the unwary and unsuspecting, who are ignorant of what they buy, only looking at *cheapness* in the price. Such meat *must* be diseased and unwholesome.

Nothing short of stringent laws for the inspection and condemnation of such cattle will correct this dishonest traffic, and save the community from the bad effects of consuming such unhealthy food. *Sanitary* protection of the community in our cities demands it. The

numerous instances of such traffic which have come to the eyes and ears of the Commissioners, compel them to expose these glaring impositions, which from small beginnings have now become so frequent as to demand the action of the Legislature to enact strong and positive laws for the protection of the people from further impositions of the kind.

To follow this *cheap* and unwholesome trade, the Texan and the inferior classes of our own native stock offer the greatest inducements for unscrupulous men. The poorer classes in our cities clamor for *cheap* meats, and as these kinds of stock are offered to them comparatively low *in price*—but in reality the dearest, when the amount of bone, gristle, and offal is considered, and which they do not consider—the imposition upon them is cruel and inhuman.

Yet the Texan cattle are not altogether of the class above named. Many of them, when well wintered in the western States, with good summer pasture, and corn feeding following, produce good and healthy and palatable beef, even with the signs of their native previous disease lying latent within them. But, with the overdriven, jaded and abused ones, the disease is liable at any time to break out, and communicate to other healthy ones with which they come in contact and association; or, they may leave it in the cars in which they are transported, in the streams or pools from which they drink, the pasture on which they graze, or on the roads over which they are driven.

SHEEP AND SWINE.

The abuses which have been recounted in regard to cattle, also appertain to sheep and swine, but not to an equal extent. They equally require inspection, and condemnation, if necessary, at the cattle yards and shipping points, as well as rest, food and water. Large numbers of diseased, maimed and bruised ones are bought, slaughtered and sold in the markets, and consumed by the unsuspecting buyers of cheap meats, quite as deleterious to their health as the bad beef, and in this disposition, the buyers and consumers require equal protection from their bad effects.

REGULATION OF STOCK TRANSPORTATION.

From the attentive observation which the Commissioners have been able to make, and the various information they have obtained, they are satisfied that laws regulating the transportation of live stock to market, should embrace—

1. A careful and thorough inspection of all stock on their arrival at the transshipping yards in the State.
2. The selection and condemnation of all diseased, maimed and dangerously bruised animals, which, if unable to be immediately

removed into quarantine, or driven into the country, out of the way of healthy animals, should be immediately taken to rendering houses and their carcasses summarily disposed of.

3. A rest to the stock of full twenty-four hours, in which they have sufficient wholesome food and water.

4. That they should not remain on the cars a longer time than twenty-eight hours (barring unavoidable delays and accidents to the progress of the cars), and that their passage between Suspension Bridge or Buffalo and Albany should not exceed that length of time. At the latter place they should be again unloaded for food, and rest twenty-four hours before shipped to New York.

5. Stock passing by the Erie road, or coming in by the Atlantic and Great Western road, should be unloaded at Campville, and there fed, watered and rested as at Buffalo, before proceeding to Jersey City or New York. And in the latter place they should, on their arrival at the yards, be fed and watered, unless they proceed immediately to the slaughter-yards; and also that power be given to the State Commissioners to make any other or additional regulations, which the necessity of the case may demand.

OBJECTIONS TO THESE LAWS.

It may be complained, on the part of some of the drovers and dealers, that such rules may be too stringent; that it will bear hard on those who have invested heavy sums in the purchase of their stock; that they are unnecessarily kept out of a return of their money; that a rising or a falling market may seriously affect such delay, and prove greatly disadvantageous to their interests.

In some instances it may be so; but is not the health and welfare of the people who consume their stock, to be equally considered? Animals pushed with such headlong speed through from their first shipment to market, lose much flesh and weight — an average of quite one hundred or more pounds per head — and the tissues of their entire system are turned into a feeble, disordered and feverish condition, to say nothing of such barbarous and inhuman treatment to the poor brutes themselves. And this treatment is oftentimes greatly aggravated by the merciless beating, punching with iron-sharpened goads, and maltreatment they receive in their “handling” by some of the drovers and their attendants.

Again, there are great numbers of first class cattle, sheep and swine, well fattened, of large size and heavy weights, which must, of necessity, be shipped and transported with care. They are valuable. Their owners know it, and are watchful that they be rested, fed and watered at proper times and places. It is for their interest

so to do, that their stock may arrive at market in good condition, and bring good prices. They make no complaint of delay, or of losing time and capital in their transportation. "A merciful man is merciful to his beast," and if the owners of inferior stock show less regard to their meaner or cheaper things, they should be compelled, by all considerations of humanity, as well as sanitary law, to comply with like conditions which the owners of better cattle impose upon themselves.

REGULATIONS OF OTHER STATES.

Although it is to be hoped that the several States west and south of us will do their whole duty in this matter, by enacting such laws regulating the stock trade and transportation as may be needful within their own boundaries, the State of New York should, irrespective of their action, do its whole duty to itself and its people. Our population is rapidly increasing. We must receive the bulk of our meats from the West. It is indispensable to the health of that population that these meats should be wholesome and of good quality. It is an imperative duty, so far as the law-making power is concerned, to render them as much so as possible, and the Commissioners would fail in a grave and solemn duty did they not present all the facts and considerations within their power to the consideration of the Legislature.

OBSTACLES IN THE WAY OF INVESTIGATING THE NATURE OF THE DISEASE.

As this peculiar disease has never been known in the Eastern States, and had nowhere been investigated, the Commissioners were greatly embarrassed when its appearance in New York created so much alarm in the month of August last. They were in no condition to institute a series of investigations under their own direction, for their duties called them into every part of the State, and required them to be on the move a large portion of their time.

The small appropriation made for the use of the Commission, under the act of 20th April, 1866, having lapsed (under the two years Constitutional provision), the Commissioners were without funds to pay their personal expenses, much less to call into service such professional gentlemen as were competent to carry forward the work of investigating the disease.

TAKEN UP BY THE METROPOLITAN BOARD OF HEALTH.

By an unlooked-for and most fortunate concurrence of circumstances, the Commissioners were relieved from their embarrassment by the action of the Metropolitan Board of Health, which had, at the first outbreak of the disease at Communipaw on the 8th of August,

organized a special committee of its medical officers to investigate the nature of this fearful malady.

It will be recollected, that, at the first meeting of the Commissioners in Albany, on the 18th of August, Dr. Moreau Morris, Sanitary Inspector of the Metropolitan Board of Health (who had been specially charged by that body with the inspection of all cattle arriving in the metropolitan district), was appointed Assistant Commissioner and clothed with State authority to act along the lines of approach to the city, while the Commissioners themselves were engaged in other parts of the State.

LETTER OF DR. HARRIS, REGISTRAR OF VITAL STATISTICS.

Before the Commissioners had left Albany, on the 19th of August, Dr. Harris, Registrar of Vital Statistics, under whose direction the investigations of the Metropolitan Board were being conducted, communicated to the Commissioners the desire of the Metropolitan Board of Health, that the State Commission should assume the conduct of these investigations; but no action could be taken in regard to such proposition, until the Commissioners could be spared from the duties then pressing upon them in the western parts of the State.

OPERATIONS OF THE SPECIAL COMMITTEE OF THE METROPOLITAN BOARD OF HEALTH.

When the Commissioners finally reached the city of New York on the 2d of September, they found the measures that had been adopted by Dr. Morris under the double authority of the city and State, were so very judicious and salutary in all their results as not only to give entire satisfaction to all concerned, but to render it obvious that this co-operation of the Board of Health and the Commission must continue as begun, and that there must be an entire unity of plans and purposes.

Already the unwearied labors of those gentlemen connected with the Board who were studying the disease, had been crowned with discoveries of an extraordinary character and the acquisition of a large amount of valuable information, not only in relation to the Texas disease, but to pleuro-pneumonia, also.

PROPOSITION TO TURN OVER THE INVESTIGATIONS TO THE STATE DECLINED.

It was at this time that the medical officers of the Board of Health who were engaged in these investigations, again, and more formally, expressed their wish to wholly relinquish their scientific investigations, and transfer whatever facilities they possessed for carrying

them on, to the State officers acting under the special law for preventing the spread of infectious diseases among our cattle.

But this proposition the State Commissioners unhesitatingly declined, and earnestly requested that the gentlemen who had commenced these labors in the metropolitan district, should continue them. It was eminently proper that the thoroughly scientific and devoted medical officers, whose comprehensive and exact researches into the causation and prevention of pestilential and infectious diseases had already commanded the respect of the medical profession, and had shown how to apply such knowledge in disarming the most threatening of human pestilences in former years, should conduct and complete, in their own way, their inquiries concerning this cattle disease.

SPECIAL REPORT.

Yielding to the request of this Commission, the investigations of these medical officers of the Board of Health were continued during the remainder of the season, and this Commission herewith submits a body of evidence which the Metropolitan Board of Health has caused to be prepared in the interests of the public health and sanitary knowledge.

Although this evidence constitutes a portion of the report of the Metropolitan Board of Health to the Legislature upon the public health of the metropolitan district, yet, inasmuch as it also constitutes the most important part of the record concerning the Texas cattle disease as it was developed in the State of New York, this Commission, with the full approval of all concerned, has obtained the use of that "Special Report" to be presented in connection with its own.

It is not necessary for this Commission to add a single word of praise in regard to this "Special Report," as it cannot fail to be appreciated by the State, and by all persons interested in the applications of scientific and sanitary knowledge.

INSUFFICIENCY OF THE ACT OF TWENTIETH APRIL, 1866.

As the Act of April 20, 1866, under which the Commission has acted, was framed to meet a *foreign* enemy and prevent it from getting a foothold in this State, the Commissioners have found it very difficult to perform the duties demanded of them, in protecting the State from an infectious disease prevailing in the neighboring States from which we are receiving daily supplies of meat for our markets.

To meet such a condition of affairs as has existed in the cattle trade during the last half of the year 1868, and in accordance with the resolutions adopted by the Springfield Convention of Cattle Com-

missioners, the draft of a law, regulating the trade, transportation and handling of cattle in this State will be submitted to the Legislature for its consideration.

NO FUNDS TO MEET EXPENSES.

The appropriation of April 20, 1868, having lapsed, as before stated, the Commission was much impeded in its work, just at the time when funds were most needed and the most vigorous measures must instantly be taken to check the progress of the disease. After a few weeks, however, an arrangement was effected with the Mechanics and Farmers' Bank of Albany, under the advice and with the concurrence of His Excellency Governor Fenton and the Comptroller, by which some of the most pressing demands were met.

CHANGES IN THE LAWS ARE SUGGESTED.

By the eleventh section of the act, which now governs the Commission, the expenses of the Assistant Commissioners at the various cattle yards and stock depots throughout the State, along the routes of cattle transportation, are to be paid by the counties in which these yards and depots are located respectively.

To throw such burdens upon the citizens of such counties is manifestly unjust, as they are in no sense responsible for the evils that are introduced by stock *en route* through the State for an Eastern market; nor are the county boards of supervisors proper judges of expenditures ordered by State Commissioners in such an emergency as occurred in August last.

It is earnestly recommended by your Commissioners, that all expenses incurred under the act of April 20, 1866, not already met by the railroad companies and owners of live stock, be assumed by the State, and that the counties of Erie, Chautauqua, Tioga, Albany, Dutchess, Columbia, Orange and New York, be reimbursed for money already paid out, if any, on such account.

ESTIMATED EXPENSE TO THE STATE OF THE TEXAS CATTLE DISEASE IN 1868.

The expenses incurred under the orders of the Commission cannot, at this moment, be stated with certainty, as the accounts have not all been presented, but will not materially vary from the following

Statement.

Expenses in the Albany district, including Rensselaer.....	\$4,098 42
Expenses in the Tioga do	162 99
Expenses in the Erie do	930 00
Expenses in the Chautauqua do	276 00
Expenses in the Orange do	194 83
Expenses in the Columbia do }	3,900 00
Expenses in the Dutchess do }	
Expenses in the New York do }	
Total.....	*\$9,562 24

* Of this sum there has been paid by the county of Erie already, \$345.98; Chautauqua, \$150; Orange, \$150.

The Commissioners have drawn from the Mechanics' and Farmers' Bank of Albany, and paid out, for all purposes (\$2,230) two thousand two hundred and thirty dollars, of which sum (\$400) four hundred dollars was used to defray expenses in the metropolitan district; making a total cost to the State, when all known demands are paid, of about \$11,792.24, for which an appropriation is asked.

Although it is to be hoped that no considerable expenditure will be necessary during the year upon which we have entered, prudence requires that a sufficient fund to meet emergencies be placed at the disposal of the Commission.

CONCLUSION.

In conclusion, the Commission cannot but feel, that though the State has barely escaped a great calamity, the visitation of the Texas cattle disease has not been an unmixed evil.

As direct resultants of investigations connected with this cattle disease, some of the most brilliant and useful discoveries in sanitary science have been achieved. Pleuro-pneumonia has been successfully treated, and a remedial agent of incalculable value has been brought into common use among the herds and flocks of the State.

With reasonable care on the part of stock owners in keeping themselves supplied with carbolic acid in some one or more of its forms and using it freely on their premises, there appears to be a perfect immunity from diseases that have, hitherto, carried inevitable destruction wherever they appeared.

Further than this, the observations of the Commission warrant the belief that this same agent possesses curative properties of the greatest value when applied to "foot rot" in sheep.

From the fact that carbolic acid acts specifically upon all germs or seeds of disease that are propagated in a manner similar to the spores, or fungus parasites of the Texas disease, it is not too much to hope that it may be used successfully in the treatment of many diseases in animals heretofore regarded as incurable, especially the glanders in horses; inasmuch as the recent researches of the world-renowned Hallier, of Jena, have brought to light in the nasal discharges and circulating blood of glandered horses, the *coniothecium equinum*,* a microscopic parasite of the same genus as the *coniothecium stilesianum*, which is the active agent in the Texas cattle disease, and is effectually destroyed by very weak solutions of carbolic acid.

Indeed, in many aspects of the case, the experience of the past year in connection with the Texas cattle disease, has been full of interest to the citizens of this State, whether engaged in the handling of live stock, or deriving their supplies of meat from the public markets of the large cities.

All which is respectfully submitted.

M. R. PATRICK,
LEWIS F. ALLEN,
JNO. STANTON GOULD,
Commissioners.

ALBANY, January, 1869.

* See last plate of illustrations in the special report of the Board of Health.

DOCUMENTS REFERRED TO IN REPORT OF COMMISSIONERS.

(A.)

THE CATTLE DISEASE; IMPORTANT PAPER FROM THE COMMISSIONERS.

Upon the request of the Governor, the undersigned Commissioners convened at Albany on the 17th instant, and after careful deliberation, make the following announcement to the public:

In view of the fact that the Commissioners appointed in pursuance of chapter 740 of the Laws of 1866, have power and are directed to establish all such quarantine or other regulations as they may deem necessary to prevent the spread of the disease (rinderpest or other contagious disease) in its transit in railroad cars, by vessels or by driving along the public highways; and also to appoint Assistant Commissioners, whose duty it shall be to carry out "such quarantine and other regulations;" and who, in order to effect this, are clothed with all the power conferred by this act on the said Commissioners, or their agents or appointees, in order to obtain a perfect history of this disease for future use; and also to subserve most fully the purpose of this Commission, they have deemed it advisable to select the most practically scientific men in the State to act as such local Assistant Commissioners or health officers, to carry out the intentions of the law and to preserve proper medical records.

They have also appointed Assistant Commissioners for the various localities infected or suspected of having been infected or exposed to the infection known as cattle disease, to the end that all persons dealing or having an interest in cattle in the various States, shall be made acquainted with the measures which this board has deemed prudent to adopt, and in order that as little delay may be caused in the movement of such cattle, or loss to the owners thereof, as is consistent in the present emergency. It is believed that the sanitary and other authorities of adjoining States, will act in harmony with this commission in promptly carrying out measures which it is hoped will speedily arrest the disease.

General instructions will be given to all such Assistant Commissioners, varying, perhaps slightly, depending upon the circumstances which may surround each locality, from time to time changing such regulations as they may deem necessary to prevent the spread of disease on its transit on railroad cars or by driving along the public highways:

Firstly. All cars containing cattle will be stopped at the most convenient point on or after entering the State, and if such cars are not in a proper sanitary condition, the cattle, even though healthy, are to be disembarked and the cars thoroughly cleansed and disinfected. After the completion of this process, if the cattle continue healthy, they can be reshipped; such cars upon reaching such further point or points of inspection as may be designated by this board, will again be inspected, and if found unclean, will be subject to such other stoppage, examination, cleansing and disinfection as may be necessary.

Secondly. If at any point on the line of said railroad or railroads, the said Assistant Commissioners shall learn by inspection or information of the existence of disease in cars, they shall be stopped at some convenient point on the road, where they have reason to believe that no infection exists, such cars thoroughly cleansed and disinfected, the sick taken from the well, and properly isolated and kept under proper sanitary restrictions and medical treatment. If any such cattle are slaughtered, the skins must be thoroughly disinfected, properly preserved and kept on the premises, or deeply buried. The carcass of the animal itself should be either tried into tallow in the most approved manner, or else, with the offal, etc., should be deeply buried. Cattle sick with this disease should not be slaughtered until, in the judgment of the Commissioner or his Assistant on the spot, they are past recovery.

The well cattle exposed to this disease should be removed from the cars to some distance, and furnished, as above directed, with a sufficiency of water and food, with salt at will, and kept under proper surveillance for such period as may be directed from time to time. All places or yards, or fields in which cattle are sick, or in which cattle have been exposed to disease, are to be kept disinfected. The sick cattle, and all such as have been exposed to disease, and in which the disease may be incubating, should be kept in an inclosure separated from all well cattle by a neutral ground of at least one thousand feet.

All cattle yards or places in which diseased cattle, or cattle exposed to disease, may have been, must be thoroughly cleansed and disinfected before being again used for the herding of other cattle. If, in the judgment of the Commissioners or their Assistants, such yards or reception places for cattle are not susceptible of being cleansed and disinfected, they will be cleansed, etc., as well as may be, closed, and other cleaner places being substituted therefor.

Thirdly. All cattle being sent to market, on entering the State, or being carried on vessels in the State, or by driving on the public highways, will be subjected to the same careful inspection and sanitary restrictions as above directed for those carried in the cars.

The clothing of persons engaged in the care of diseased cattle, or in the slaughtering or rendering of the same, or in any employment bringing them in contact with them, or of those employed in the care of suspected cattle, should be cleansed and disinfected before leaving the premises. The Commissioners will prohibit the slaughtering of animals for beef after they have been exposed to the contagion until all sanitary restriction is withdrawn therefrom.

DISINFECTION.

For disinfection of the cars, yards and other places, the Assistant Commissioners will be instructed to depend mainly upon the use of carbolic acid, the various preparations of chlorine, quicklime and the different sulphates. Attention is also called to the directions for disinfection given by the Board of Health, New York, and published on Saturday, the 15th instant, in most of the papers throughout the country. The aforesaid Assistant Commissioners will be directed to communicate daily with the Governor, each of the Commissioners, and President of the Metropolitan Board of Health, giving information and receiving additional instructions.

As the carrying out of these regulations involves a knowledge of the principles of quarantine, Dr. John Swinburne, Health Officer of the Port of New York, has been intrusted with the general sanitary supervision, and will at once make a tour of the State to superintend the carrying out of the above regulations. Dr. Jacob S. Mosher and John Phillips, of Albany, and Dr. William Manlius Smith, of Manlius, have been appointed Assistant Commissioners. Others will be appointed soon.

M. R. PATRICK, *Chairman.*

JOHN STANTON GOULD, } *Commissioners.*
LEWIS F. ALLEN, }

ALBANY, August 18, 1868.

(B.)

THE CATTLE DISEASE; OFFICIAL REPORT OF THE CATTLE DISEASE BY THE COMMISSION OF THE STATE TO INQUIRE INTO ITS ORIGIN AND CHARACTER.

The undersigned, Commissioners appointed under the act of the Legislature of the State of New York, passed April 20, 1866, for the prevention of the spread of the Rinderpest, and other infectious diseases, having, since the publication of their regulations on the 18th August, had an opportunity of seeing many cattle sick of the

Texas cattle plague, and of learning much respecting its history and the circumstances attending its manifestations, and knowing the anxiety of farmers in various parts of the State to obtain information respecting it, have deemed it proper to communicate the following facts for the information of such as are interested in cattle and beef:

1. *How the disease is communicated.* We have not heard of a single case of the disease having been taken by any animal that has not been in contact with Texas cattle, or with their excretions. We have had authentic evidence that Texas cattle that have passed over a road, dropping their excrement thereon, have communicated the disease to native cattle that passed over the same road forty-eight hours afterward. We have no evidence whatever that native cattle afflicted with the disease have in any case communicated it to other native cattle; at the same time we have not felt at liberty to act upon the negative testimony, but in our quarantine regulations we have acted as if the disease could be thus communicated. Sick and healthy animals have been mingled together at several of our quarantine yards, and in no case have the healthy animals yet developed the disease.

2. *The disease is aggravated by motion, and ameliorated by fresh air and repose.* We have abundant evidence upon this point, which is entirely satisfactory to us. Wherever cattle have exhibited the earliest symptoms of the disease, and have been taken from the cars and allowed suitable food and drink, with rest and fresh air, they have invariably recovered speedily; while those which have exhibited the same symptoms, and have gone forward in the cars from sixty to one hundred miles further, have rapidly developed the disease in its most malignant form, and it has been necessary to send them to the bone-boiling establishments. It is, therefore, decidedly for the interest of the drover to withdraw the cattle from the cars at the appearance of the earliest symptoms, and subject them to the hygienic measures above spoken of.

3. *The earliest symptoms of the disease.* The first symptom of the disease in all the cases observed by us and by our Assistant Commissioners, is an appearance of languor and weariness which is unmistakable; the head droops, the ears hang down, the eyes are staring. This sometimes occurs when cattle are terrified, but the stupid stare of the cattle affected by the disease is very different from the furious stare produced by terror. The back is arched, strong efforts are made to dung, which are often ineffectual the droppings being unusually dry, scanty and stained with blood. These symptoms are invariable. The urine is generally dark brown in color and commonly called "black water." This symptom is not, however, always present in the earlier stages of the disease. The coat is generally rough, the hairs standing almost erect. The horns are hot, the nose dry and a frothy drool from the mouth; flies settle in great numbers upon them, and the animal rarely makes an effort to brush them off. These latter symptoms are not invariable, especially the roughness of the coat. In cases of doubt, the most reliable distinguishing mark is undoubtedly afforded by the thermometer. If, in connection with the before named symptoms, the thermometer introduced into the rectum for two or three minutes, shows a temperature much higher than one hundred degrees Fahrenheit, the animal may be safely pronounced to be suffering under the disease. In some cases it has come up to one hundred and nine degrees Fahrenheit.

4. *How the meat of diseased animals may be distinguished.* The fat has a deep or high colored greenish yellow appearance, and has not the firm resistance of health. The lean meat is of a brownish mahogany color, and on being cut into has a peculiar sickening odor. Sometimes the superficial muscles have the natural pink red tint, but the deep seated muscles, and especially the intercostal muscles (those between the ribs), have the dark brown color and nauseous smell.

5. *Disinfection and disinfectants.* Carbolic acid is an absolute and perfect disinfectant. It not only destroys the odor but kills the virus of the disease. We advise all

farmers and drovers who have reason to suspect that their cattle have been exposed to the infection, to sprinkle the substance known as "heavy oil," which contains about ten per cent of carbolic acid, abundantly about the yards where they are confined, and to put some carbolic acid into the water they drink, in the proportion of one part of pure acid, with thrice its own weight of sal soda, to one thousand parts of water.

6. *The disease is not necessarily fatal.* Several cases have recovered under our immediate observation, that have exhibited unequivocal indications of severe disease at Providence, Communipaw and the national drove-yards. In some instances the diseased cattle have been pastured where they have had access to salt marsh grass, for which they have exhibited a decided fondness, abandoning the upland pastures and confining themselves to the salt marshes, and it appeared to accelerate their recovery. In other instances, where such facilities could not conveniently be had, salt was liberally supplied and a recovery was manifest. Diluted carbolic acid used as a drink has appeared to act beneficially; but we do not wish to speak positively with respect to these apparent remedies. One of the cattle which had been seriously diseased, but was convalescent, was slaughtered in our presence. The fat had nearly recovered the normal color; the lean meat still retained much of the characteristic brown color of the disease. The viscera showed unmistakable marks of recent disease, but were rapidly healing. We barely allude to this most interesting disease in this place, leaving full details for description by our scientific associates.

7. We have reason to believe that our Assistant Commissioners have been very faithful in executing our instructions. We hear from every point, that the movement and marketing of infected cattle is effectually stopped. Our Assistant Commissioner, Dr. M. Morris, acting in conjunction with the Board of Health for the metropolitan district, has been indefatigable in devising and executing a series of measures which, it is believed, will effectually protect the citizens of the metropolitan district from the dangers of diseased meat. In fact, we have no doubt that the meat now sold in the markets of that district is far more sound and healthy than it was even before the outbreak of this disease.

8. The committee for scientific investigation under the Metropolitan Board of Health have caused an extensive series of researches, under the supervision of Dr. E. Harris of that board, in regard to the chemical, microscopic and chief pathological characteristics of this disease, and also caused most accurate drawings to be sketched to illustrate the pathological changes in the several organs and tissues that are chiefly affected. These, when published, will present an exhaustive exposition of all phases of the disease, and give peculiar satisfaction to the public generally as well as to scientific men.

M. R. PATRICK,
LEWIS F. ALLEN,
J. STANTON GOULD,
State Commissioners.

NEW YORK, September 5, 1868.

(C.)

THE CATTLE DISEASE; ILLINOIS COMPLAINS OF THE ACTION OF THE NEW YORK
AUTHORITIES — COMMISSION APPOINTED TO VISIT THIS STATE.

On Monday last, says the *Springfield (Ill.) Journal* of September 2d, an informal meeting of several of the citizens of this section interested in cattle and the cattle trade, was held at the office of Colonel John Williams, in this city, for the purpose of devising some means for the protection of shippers of stock to Buffalo, New York and other points. The committee addressed a letter to Governor Oglesby, and in accord-

ance with the wishes of the committee, he appointed Messrs. Harvey N. Edwards and Edmund H. Piper as Special Commissioners to proceed to New York to look after the interests of western shippers of cattle. He also addressed a letter to Governor Fenton, of New York, in relation to the matter.

Below we publish the letter of the committee addressed to Gov. Oglesby, and other documents relating to the matter.

The following is the letter to the Governor:

SPRINGFIELD, ILL., Monday, *August 31.*

His Excellency RICHARD J. OGLESBY:

The undersigned having been appointed a committee, by a public meeting of some of the citizens of Sangamon county interested in the cattle business, to wait on your excellency as Governor of Illinois, and request of your excellency a semi-official power or authentic letter authorizing and empowering Harvey N. Edwards of Sangamon, and Edward H. Piper of Macon county, to proceed to Albany and Buffalo, in the State of New York, and there take into consideration, among the conflicting and clashing interests of the harsh speculators, the best cattle interest of the State of Illinois. There is reason to fear that the interest of Illinois will be sacrificed unless this matter is promptly attended to.

Hoping you may give as strong a power as you have authority to do, we subscribe ourselves, most respectfully,

S. H. JONES,
JOHN WILLIAMS,
W. H. HERNDON,
Committee.

Appointment of Special Commissioners.

STATE OF ILLINOIS, EXECUTIVE OFFICE, }
SPRINGFIELD, *Sept. 1, 1868.* }

To all whom these presents shall come, greeting:

Responding to the wishes of our citizens especially interested in preventing disease among cattle, and in protecting the trade in and shipment of live stock from the State of Illinois to Eastern markets, as formally expressed in a resolution passed at a meeting of citizens interested in stock raising and shipment of cattle, held in Sangamon county, August 31, 1868, I do hereby appoint and commission Harvey N. Edwards, of Sangamon county, and Edmund H. Piper, of Macon county, as Special Commissioners, to proceed to the State of New York, with full power to inquire into and co-operate with the efforts made by the authorities of the State of New York, referring to and bearing upon the shipment of cattle from this State to the eastern markets, and especially to petition the executive authority of that State and the Special Commissioners or Inspectors to whom has been intrusted, under the laws of said State, the power to impose restrictions and limitations upon the trade in and shipment of cattle to eastern markets, to so regulate and alter the same as not to hinder or embarrass oppressively the shipment of and trade in stock from the State of Illinois. In this respect due consideration will be given to prevent and suppress the disease or threatened epidemic among cattle.

The Commissioners appointed by this authority have full power to enter into any arrangements necessary to a satisfactory settlement of all questions arising upon the subject of their appointment.

In testimony whereof, I have hereunto set my hand and caused the great seal of the State to be hereunto affixed. Done at the city of Springfield, this first day of September, in the year of our Lord one thousand eight hundred and sixty-eight.

RICHARD J. OGLESBY.

By the Governor:

SHARON TYNDAL, *Secretary of State.*

Letter of Gov. Oglesby to Gov. Fenton.

STATE OF ILLINOIS, EXECUTIVE OFFICE, }
SPRINGFIELD, Sept. 1, 1868. }

His Excellency REUBEN E. FENTON, *Governor of the State of New York, Albany :*

DEAR SIR—I take pleasure in introducing to you, and recommending to your favorable attention, Messrs. Harvey N. Edwards and Edmund H. Piper, of this State, whom I have this day taken the liberty to appoint as Special Commissioners to visit your State for the purpose of making inquiry into the restrictions your authorities have deemed it important and necessary to impose upon the trade in and shipment of cattle from this State to the eastern markets, in consequence of an apprehended epidemic among cattle, commonly known as the Spanish or Texas fever. I will thank you, in behalf of the citizens of this State, for any assistance or suggestions you may be able to give these gentlemen, to aid them in securing the objects of their appointment.

They have been instructed to present to you their authority, and to confer with you freely on the subject, in a spirit of entire good will, to the end that trade may not be unnecessarily restricted, and that both the consumer and shipper may enjoy the full benefit of as free trade as is possible under the circumstances.

With high regards, I am, Governor, very respectfully, your obedient servant,

R. J. OGLESBY, *Governor of Illinois.*

(D.)

ALBANY, October 13, 1868.

DEAR SIR: In view of the ravages of the disease known as the Texas fever among cattle, and the inadequacy of the laws enacted by the several States for the repression of this and other kindred diseases, and the conflicting provisions of these laws, which has been disclosed since this disease has been prevalent, a general desire has been felt and expressed by farmers, drovers and the consumers of meat in several States, that a wise and efficient legislation should be adopted for the repression and prevention of this and other similar diseases in the several States, so that the laws should be harmonious, and adapted to mutual protection. And it has been believed by nearly every one that has expressed an opinion upon the subject, that the best mode of effecting this object is by the assembling of a convention of the Cattle Commissioners of the several States interested in the subject, who would represent all the varied interests of the producing and consuming States, and supply all the information necessary for the full elucidation of the subject, and whose duty it should be to prepare a draft of a law which should ensure the most perfect protection to all parties, to be recommended to the several Legislatures for adoption. And the Commissioners of the State of New York having been requested by the Commissioners of several of the States, and of the Dominion of Canada, to take the initiative in calling such Convention,

We do, therefore, recommend that a Convention be held in the city of Springfield, in the State of Illinois, on Tuesday, the first day of December, 1868, at twelve o'clock at noon of said day.

The object of such Convention is to consider the pathology, symptomatology and history of the Texas cattle fever, and other infectious and contagious diseases to which cattle and other stock are subject, and the best methods of preventing the spread of such diseases with reference to the interests of the producer and consumer, and also to consider the sanitary requirements of the community with reference to the feeding and rest of the animals in transitu, and to the best methods of slaughtering and preparing them for market. The Convention will also prepare a draft of a

law which shall provide for the accomplishment of these objects, to be submitted to the Legislatures of the States represented therein for adoption. Each State and Province to be represented by three (3) Commissioners.

The Cattle Commissioners of the State of Illinois are requested to secure a suitable place of meeting for the Convention.

His Excellency the Governor is hereby respectfully requested to transmit copies of this call to the Governors of the several States, where such Commissioners are not already appointed, with a request that they would appoint such Commissioners to represent their States in such convention.

M. R. PATRICK,
L. F. ALLEN,
JOHN STANTON GOULD.

(E.)

SUGGESTIONS TO FARMERS.

1st. When the disease makes its appearance in any neighborhood all the owners of neat cattle should make a point of examining each animal every morning.

The chief points to which their attention should be directed, are the following:

(a.) The head. Whether it hangs down; whether the eyes are dull and staring; whether the horns are hot or cold.

(b.) The coat. Whether it is rough or smooth.

(c.) The urine. Whether it is a dark red or black.

(d.) The hind legs. Whether the gait is staggering, and whether the knees seem weak.

(e.) The dung. Whether it is natural or otherwise, and especially whether the animal arches its back and makes ineffectual efforts to dung.

(f.) See if there is any drooling of frothy matter from the lips.

(g.) If you have a fever thermometer, insert it into the rectum (bung), let it remain until the mercury ceases to rise, then note the temperature. If it is 102° Fahrenheit, and any of the above mentioned symptoms are present, you have good reason to suspect the presence of the Texan cattle fever, and the probability is increased by every additional degree of temperature.

(h.) It is very important that the dates be carefully observed of all the symptoms connected with the disease, and experience has shown that memory is very untrustworthy; by all means, therefore, let the above facts be clearly *written down* as soon as possible after the observation is made.

(i.) Shut up all suspected cattle in a lot or building by themselves, so that no other cattle can have access to them or their droppings.

(j.) Send word as soon as possible to the nearest Assistant Commissioners of the suspected cattle, by telegraph, if one is accessible.

2d. Means of prevention.

(a.) When the disease is present in any neighborhood, every owner of cattle should be provided with a barrel of heavy coal oil, which contains from eight to twelve per cent of carbolic acid, and a quart of liquid carbolic acid containing ninety per cent of the acid. The latter is miscible with water, the former is not.

(b.) If the suspected cattle are kept in a building, let the floors be sprinkled with heavy oil, and especially let it be sprinkled on the droppings as fast as they are made. The woodwork of their stalls and behind their stalls should be covered with this substance, spread on by a common whitewash brush. The heavy oil may be sprinkled on the floor with a common watering pot.

(N. B.—These articles are furnished by the Warren Chemical Manufacturing Company, No. 4 Cedar street, New York.)

(c.) If the suspected cattle be herded in a yard or small pasture, let the droppings be sprinkled daily with heavy coal oil.

(d.) Remember that strict isolation is the chief means of safety. Let no strange animal come upon the place. Let no suspected animal go upon the public road, or have access to running water to which other animals go. The dung and urine of diseased animals are the chief means of propagating the contagion, and it is known that it is often diffused by the dung which adheres to the shoes of attendants. A box containing slacked lime or ground plaster, well saturated with the heavy oil, should be kept near the diseased animals, and all persons when leaving the vicinity of such animals, should carefully rub their shoes in the powder in the box.

3d. Curative means. There is no certain cure for the disease. Some animals get well without any medicine, others seem to have been benefitted by feeding in a salt marsh and on green corn.

(a.) In case you have the liquid carbolic acid of ninety-five per cent which will mix with water, drop enough of it into a part of water to give a slight taste to the water, and let the diseased cattle drink of it twice a day.

(b.) If you have nothing but the heavy oil, mix three ounces of soda with it, which will render it miscible with water, and put the mixture into a quart of water; pour enough of the mixture into a pail of water, and let them have two pailsfull a day.

(c.) Let the sick animals drink freely of water, as they are generally thirsty, and place salt where they can lick it whenever they are disposed to do so.

(d.) With regard to food follow the advice of the medical practitioner.

(N. B.—If carbolic acid cannot be obtained, dissolve two pounds of sulphate of iron—green copperas—in a gallon of water, and use the solution as directed for the heavy oil.)

Let all animals that have died of the disease, be buried at least seven feet deep. Cover them with a barrel of lime, then replace the earth.

" F "**REPORT UPON INVESTIGATIONS CONCERNING
THE TEXAS CATTLE DISEASE.**

To the Sanitary Committee of the Metropolitan Board of Health :

The investigations that were committed to your direction in regard to the infectious disease in beef cattle, by the Metropolitan Board of Health, are now so nearly terminated, that it becomes a duty to report to you the results which have been reached in the inquiries that you placed under the writer's supervision.

In presenting this report, the superintendent of this work feels that it is due to your committee, and especially to the medical officers who have been engaged in these researches, to state, that this duty was undertaken at a period when each of us was burdened with an unusual amount of work, and that whatever may appear in the report to be incomplete and too meagre in the record of details or circumstances concerning these labors, might justly be charged to the excessive demands that were made upon our time, as well as to the new and difficult nature of the investigation. And, in addition to this, it is proper to remark, in this prefatory paragraph, that these investigations were at first undertaken and subsequently carried forward, step by step, wholly from a consciousness of the duty which was due to the Board of Health and by the Board to the public; and that, if the Board could have found the means to employ more aid in this work, your committee would now be able to present at the conclusion a more complete report.

The exigency was instantaneous, and the duty of making an investigation in the interests of the public health and of sanitary knowledge was obvious; but, until the nature and extent of this remarkable infection in the herds that supply our markets had become known, it was not certain that the results of these investigations would warrant the scope and cost of them, unless the labors were voluntarily assumed by medical men who were already in the Board's service. The possibility of prosecuting any exact and trustworthy scientific investigations depended, practically, upon the willingness of medical officers to make considerable sacrifices of time and toil; and it is due to them and to the Board that the fact should here be stated, that the hope of making these investigations contribute something to hygienic and medical knowledge, particularly in regard to pestilential fevers, continued to inspire and sustain these labors after all danger of the sale and use of the diseased beeves had passed. The medical profession and sanitary authorities will bear witness that this hope has not been disappointed.

Practical difficulties, in conducting such investigations, unfortunately deter Boards of Health and individual observers from attempting to make their inquiries systematic and convenient; and it has been found impossible to make all branches of these inquiries in New York as complete as the requirements of exact investigations demand. This is especially true of the medical observations upon symptoms and tests of the disease in its various stages. But whatever observations were possible during the brief last stage of the disease are put on record in this report. Great difficulties were experienced by the committee of investigation in reaching the diseased animals and providing for the killing and dissection of them. So sudden was the onset of the obvious and fatal stage of the malady, that this circumstance is found to have effectually defeated the attempts of many of the best sanitary officers in other places. It has been easy to find and observe dead cattle, but difficult to bring medical observation to bear upon the living, and upon the condition

of the organs and tissues at the moment of death and before any *post-mortem* changes could occur. It is this latter feature of success that gives special value to the results reached in the Metropolitan District.

The requirements of the present advanced state of pathological and hygienic knowledge demanded that whatever investigations we undertook in this matter should extend beyond the merely superficial and obvious phenomena and appearances, and that, so far as possible, the methods and purposes of each line of inquiry should be exact, searching, and strictly in accordance with the requirements of the sciences whose aid should be invoked in the work. It was also known to us, that the Metropolitan market being the natural terminus for such herds of infected beeves as might be hurried forward by the unfortunate holder of them—true to “the commercial instinct to make whatever salvage he can” when an incubating poison threatens inevitable destruction to his cattle and his fortunes—the opportunity and the public duty of making faithful investigations would probably be greater in New York than at any other point east of the prairies, which had become the temporary source of the disease. Experience soon confirmed the truth of this opinion.

Let the nature of the sanitary questions, which were of predominant importance in these investigations, may be misconceived by readers of this report, the fact must here be stated that no medical officer presumed that the Texas cattle disease would reproduce itself in the human family. But it was believed, and it is true, that the rapidly and utterly putrefactive effect of the disease in the fatal stages of it, clearly pronounce upon the unfitness of such dying cattle for human food. This view of the subject did, at first, very energetically animate the endeavor which the Board of Health put forth to prevent such dead and diseased beeves from being sold in the markets. But it must not be supposed that the Board's officers were ignorant of the fact that some of the most virulent viruses, even those of the rattlesnake and the woorara, may be taken into the human stomach without obvious harm. The point aimed at was attained, namely, to prevent the diseased and dying beeves from being used as food. The means employed by the Board in attaining this result were universally understood and appreciated. The press and the people throughout the Metropolitan district, and wherever the diseased cattle were seen, emphatically sustained and commended this action of the Board. Herdmen and agriculturists also gave their willing testimony and obedience to the mere recommendations of the sanitary officers, and are now sincerely grateful for the practical results of the sanitary regulations and the scientific inquiry relating to the disease.

In pursuing these labors the Board's committee has sought information from every available source throughout the country, and has enjoyed the most hearty co-operation from every class of observers of the disease; and it seemed very desirable to make investigations, upon as broad a basis as possible, of general information concerning it. Such a basis has given a certain tone of trustworthiness to the Board's work that is justly a subject for the committee's gratitude. Great care has been taken to examine and analyze the mass of general and special evidence that has, by the kindness of correspondents and co-workers, come into our hands. The conclusions that are reached in this report are in harmony with all that is logically deducible from that body of evidence, though we have depended upon our own observations and collateral researches that grew out of them.

Could the medical officers who have pursued these inquiries now consult their personal preferences, they would defer the presentation of this report until there shall have been a free interchange of the various reports by State Commissioners; but the request that this report shall be submitted without such delay is obeyed with alacrity, because both the Board of Health and the State Commissioners for the prevention of cattle plagues in New York, have expressed a desire to make immediate use of the information contained in this report. But, in thus hastily closing the report, it must inevitably be marred by defects that will need to be corrected hereafter. The culture experiments upon the cryptogamic or fungus element found in the blood and bile of the infected cattle, are still in progress, under the skillful hands of Dr. Stiles, the deputy registrar of the Board of Health, and of

Prof. Ernst Hallier, of Jena, and will be continued as long as they may deem it desirable. These and some other incidental inquiries, while they may eventually throw light upon the causation and concomitants of the disease, do not in any way postpone the practical conclusions and sanitary measures which State authorities need to adopt. And there is much reason to believe that every branch of the investigations, which have been commenced under the approbation of your committee and of the Board, will ultimately lead to a correct knowledge of the disease and to the utter extinction of it. If, in attaining that result, it is found that important truths are established, concerning the cause and prevention of certain pestilential diseases in the human family, the public duty of exact inquiry into the causes and prevention of all epidemic and epizootic diseases will be practically illustrated. This ultimate effect of medical inquiry will not fail to be attained if sanitary officers will, in the discharge of their duties as guardians of human health, carefully observe and investigate the nature and causes of the infectious plagues that occur in those useful classes of animals which the beneficent Creator has given to man for food and service. The people who require safeguards against insidious sources of disease will share with the herdman and the farmer such immediate and obvious benefits of the sanitary investigation and restraint of cattle plagues as will fully repay the toil it costs, and, in the end, the total results will be found added to the sum of human happiness and healthy life.

E. HARRIS.

NEW YORK, *December 31st*, 1868.

PLAN OF THIS REPORT.

I. A consecutive account of Events connected with the appearance of the Texas Cattle Disease and of the procedures which were taken thereon.

II. The Records of the Sanitary Inspector of the Board and Assistant Commissioner of the State, concerning the Herds of the Diseased Cattle that have come into the Metropolitan District; Dr. Moreau Morris' special report.

III. Statement of the results sought and reached in Correspondence with other observers.

IV. Statement regarding the chief objects of exact Scientific Investigations, the nature of the Methods adopted for attaining them, and the Results attained.

V. Special report by Dr. R. Crosson Stiles, upon the Pathology of the Cattle Disease, and upon the Microscopical researches for ascertaining the Nature and Effects of the Contagium or Cause of this Disease.

VI. Report of the results of Chemical Analysis of the Blood, Bile, Urine and Liver obtained from the diseased cattle. By Professor C. F. Chandler.

VII. Explanations of the Illustrations.

VIII. With what well described diseases is this Texas Cattle Disease allied.

IX. Remarks upon the New Facts and Demonstrations added to Physiological and Pathological Knowledge by these Investigations.

X. Conclusions.

I.

ACCOUNT OF EVENTS AND PROCEEDINGS; DISCOVERY OF THE
DISEASE IN THE HERD-YARDS.

Early on the morning of August 8th, the Registrar of the Board of Health obtained information from a member of the staff of the *Daily Tribune*, that there was believed to be a herd of diseased and dying cattle at one of the two great herd-yards near Jersey city. Certain unusual events in the progress of sudden and fatal diarrhoeal disorders in various parts of the city of New York, in the previous ten days, induced us to make a personal investigation concerning the reported herd of infected cattle. Proceeding to the abattoir yards at Communipaw, the fact was ascertained that there were then remaining alive upon the ground there, 141 bullocks that arrived the previous day, consigned to J. T. Alexander, Esq., Mr. Fitch, agent, and out of which there had died or been sacrificed, because dying, 224 bullocks, during the trip from Homer, Ill., to this eastern terminus of the route.

Having ascertained the fact that these cattle had been shipped from central Illinois, in apparently perfect health, only eight days previously to the visit here mentioned; that the care of that herd-train had been quite as good as is usual upon the railroads; that the disease began to be noticed about the second day after departure upon the route, and that between central Ohio and the time of departure of that cattle train from Pittsburgh a period of four or five days, no less than 159 of the herd died of the disease, permission was asked and granted, for examining the residue of the herd then in the yards at Communipaw. About fifteen out of the hundred and upward that were seen, appeared to be sick, and upon testing the temperature of two that were approached, the mercury in the self-registering thermometer went up to 105° and 106°, respectively. This observation not only comported with the circumstantial history of the events above related, but of itself alone, this remarkable excess of animal temperature, in the absence of any evidence of inflammatory disease, and with the pulse rapid and flickering, the secretion from the kidneys copious and blood-stained, and the gait and posture tremulous, fully warranted the conclusion that the disease there witnessed for the first time at our herd-yards must necessarily be of a pestilential nature, and that any virus or morbid poison, which could cause such a malady, was deserving of the most exact and careful scientific inquiry.

The peculiar circumstances of the season, which had made it necessary to watch very vigilantly for all removable and special causes of acute and fatal diarrhoeal disorders among the people of the city, rendered it a duty to undertake a careful examination of the viscera and fluids of the dying bullocks, to ascertain what diseased conditions they might present. Accordingly, the Registrar requested the President of the abattoir to allow the medical officers of the Board an opportunity to make such examinations, at the earliest convenient hour. It was earnestly advised that no sick cattle should be sent over to the city markets, either alive or dead. Mr. Payson, the President, took an enlightened and proper view of all questions connected with this matter, and remarked that it would be well to have the Governors of New York, New Jersey and Pennsylvania take such action, in concert with the Governor of Illinois, as might lead to the proper investigation of the local sources of the disease, and to a proper restraint upon the transportation of cattle subject to it. The course pursued by that gentleman, during the evening of the 8th and the morning of the 9th of August, proved how judiciously and honorably he undertook his own duty in regard to the sick cattle. To this we will presently refer again.

During the afternoon of the 8th, Hon. Geo. B. Lincoln, President of the Board of Health, in concert with Hon. Commissioner Manniere, decided to have the herd-yard, within the limits of New York city, inspected, under the direction of the Sanitary Superintendent, Dr. E. B. Dalton. The circumstances and results of that inspection are mentioned in the proper place in the special report of Sanitary Inspector Dr. Morris.

Upon the return of the Board's officer from Communipaw in the afternoon, it was deemed expedient to send dispatches to the Governors of New York, New Jersey and Pennsylvania, giving them information, and suggesting such action on their part as should at once restrain the movement of all sick and infected herds. Consequently the President of the Board sent telegraphic dispatches to Governor Fenton at Albany, Governor Ward at Newark, N. J., and Governor Geary at Harrisburg, Pa., informing them of the sick cattle, and suggesting the sanitary inspection of the transport trains and herd-yards on the railroads that enter these States from the west. The several governors replied that the desired action would be taken.

There doubtless may have been some persons who thought that such promptitude of official inquiry and action was unwarranted, by any possibilities of peril and by all lessons of experience. And, that there may occasionally be found a man who still believes that it would have been wiser to wait and see the results of the pestilence and of the use of the diseased beeves as food, is not unexpected. But the public would not have excused the sanitary officers for any such stolidity and indifferent delay, nor does experience warrant the belief that it would have been safe or prudent to have delayed action. Indeed it chanced to be true, that the officer who first moved in this duty for the Board of Health knew the history of epizootic pestilences too well to admit of hesitation and delay.

The following extract from an editorial leader in the *London Times* of August 28th will now be perused with advantage, for it conveys the true principles regarding such duties in clear and forcible language:

"As the home of the rinderpest is on the steppes of Russia, so this American plague comes from the vast plains of Texas. Now, it appears that during last May and June some 15,000 cattle were slowly driven from Texas to Illinois, feeding on the prairies as they passed. * * *

"From Illinois the disease spread to the adjoining State of Indiana, where thousands of cattle are still said to be dying of it, and to the city of Chicago. The next step in its progress was that some Illinois cattle were dispatched by railway to Pittsburg, in Pennsylvania. Before reaching Pittsburg a large proportion of them perished, and others died in the Pittsburg drove-yards. Thence some apparently healthy animals were sent by rail to New York, but the fatal symptoms appeared after their arrival, and, within ten or twelve days after the appearance of the cattle at Pittsburg, the disease had penetrated to the northern part of New York State. The history of the development of the disease, therefore, is complete. From Texas it is tracked over the prairies to Illinois, and thence it is followed over the railways to the great towns of the West. With us, though the course of the rinderpest is sufficiently established, there are generally some doubtful links in the chain of communication, but in this instance every step is discernible. * * *

"The gentlemen who thought it a fatal objection to a precautionary measure, that it might slightly raise the price of meat in the London market, may, perhaps, accept instruction from the fact, that, on the appearance of this disease, the supply of beef in the markets of New York and Chicago had fallen off at least one-half. They may see that, from fear of a slight and very doubtful disadvantage, they would have exposed us to the certain peril of an occasional meat famine. This example may also give us occasion to reflect, that, at least in the present state of our knowledge, we are quite unable to rely on special acts of precaution against the introduction of a contagious disease. Here is a disease, not less fatal than the rinderpest, of which we have only just heard; and, besides this, its approach is so sudden or so subtle as to leave no time for exceptional measures. Cattle apparently healthy are dispatched to New York, and within three days after their arrival they have given birth to a malady which may destroy all the stock in the State. That is the danger to which we are exposed the instant we relax our restrictions. Inspection might some day fail to detect the germ of disease in half a dozen animals, and the cattle of as many counties might be decimated in a month. Our knowledge is not sufficiently extended, our means of information not sufficiently complete, our methods of observation not sufficiently subtle for inspection, to offer any sufficient security. It is somewhat singular that we should only now be learning to what subtle and contagious diseases our most valuable stock is exposed. Like other knowledge, this has probably been lost from mere want of due records. If the past history of the diseases of mankind had been preserved for us, medical science might now be in a very different position. This disadvantage will scarcely be allowed to check our progress for the future. The new as well as the old world will yield experience, and we think we may fairly expect from our men of science that, with their means of observation, they will materially advance our control over the conditions of health. At all events, such an example as the present deserves the utmost attention, and we shall await with the greatest interest the further history of 'the Texan fever.'"

THE FIRST POST-MORTEM EXAMINATIONS.

The next day, Sunday, August 9th, the President of the abattoir informed the Board of Health that all the surviving bullocks of Mr. Alexander's infected herd were to be slaughtered and sacrificed at the fat-rendering tanks, and he invited the officers of the Board to be present and make whatever examinations they desired. This invitation was accepted, and, during that afternoon, the officers in attendance witnessed the slaughter of a large number of the herd, and made minute examination of the viscera and fluids of three of those that were most diseased. The record of these and all other post-mortem examinations of cattle will be found in the proper place in a subsequent section of this report. But we would here remark, that the excessive temperature of the blood and viscera of the sick bullocks, immediately upon the slaughter, was so uniform and striking as to confirm the opinion that had been expressed by the Registrar, concerning the significance of this fact, in regard to the pestilential nature of the sickness; yet, in these first examinations, there was so great an amount of evidence of other kinds, and which required the analysis of the microscope and of the chemist, that arrangements were immediately made to have the morbid specimens so examined by Dr. R. Cresson Stiles, the Deputy Registrar of the Board, an acknowledged authority in pathological and microscopical researches, and by Prof. C. F. Chandler, the chemist to the Board. The subjoined note from Dr. Stiles gives the first result he reached in the microscopical examinations which he made of the specimens obtained on the 9th and 10th of August:

BROOKLYN, Aug. 12th, 1868.

E. HARRIS, M. D., Registrar, etc.:

DEAR SIR: I have examined carefully the specimens of the plague cattle which I took on Sunday (Aug. 9th). I went at them at once, before decomposition could change their character.

The Blood. Not a single red blood disk could be detected. The red disks had parted with their coloring matter, and the serum was of a dark mahogany color. This evidence of disorganization of the blood is a most important fact, as indicating the nature of the disorder.

The Urins was of a glutinous character, excessively albuminous; the blood corpuscles, which were abundantly contained in it, were shrivelled and crenated. The urine was of claret color, and contained a few casts of the *tubuli uriniferi*.

The Kidneys were deeply congested with dark blood, and their *glomeruli* and *tubuli uriniferi* were filled with extravasated blood.

(Signed) Yours,

R. C. STILES.

Thus the work of scientific inquiry commenced, and the foregoing quotations, from the first written statement by Dr. Stiles concerning the pathological changes which characterize the disease, show what direction this kind of inquiry took. The notes of the observations made upon this first group of infected cattle will be found in the subsequent chapter of this report. Unfortunately, our efforts to procure a complete chemical analysis of the fluids from these first cases were unsuccessful, yet, from one of this herd that was slaughtered on the eighth day of convalescence, entire success attended the analysis of the blood, etc.

Having examined as many of the animals as practicable in this first herd, before and during slaughter, it was deemed expedient to have a certain number of the bullocks that exhibited unmistakable symptoms of the disease, and yet were not rapidly sinking or incapable of moving about, selected and kept under medical observation and care, in order that the nature of the disease might be suitably studied, or, if the sick bullocks survived through certain periods of partial or actual convalescence, they might at suitable periods be, one by one, slaughtered for the purpose of making *post-mortem* examinations of the results of the disease, and the mode and rapidity of convalescence from it. Consequently, by the liberality of the agent of the stock, five such diseased bullocks were selected and placed by themselves in a large yard that was spread with a bed of sawdust, saturated by heavy oil of coal tar, and they were allowed to spend the greater part of each day in an adjacent meadow of luxuriant salt marsh grass. The further treatment of these

sick cattle, and the results of final examinations of them when slaughtered, will be found in the subsequent sections of this report under the heads of Inspection and Care, Chemical Analyses and Post-mortem Records. But it should be mentioned here that the result of these observations were more definite and satisfactory than we had anticipated. In fact, the investigations pursued in regard to this first group of infected cattle served to open up the whole field of inquiry that was subsequently occupied by the medical officers who followed up the subject.

The fact must here be mentioned that the excessive pressure of regular official duties, the difficulty experienced in securing the attendance of each officer and expert at the hours of slaughter, and the great distance and inconvenience of access at the abattoirs from the chambers of the Board of Health, offered serious impediments to successful study of the disease at the beginning and throughout the entire season. These and other considerations led us to hope and greatly to desire that the State Commissioners of New York and New Jersey, who still had authority under their commissions to guard against rinderpest and contagious pleuro-pneumonia, might, as soon as they could organize for the purpose, assume all the responsibilities and expenses of the investigations which needed to be pursued.

Another fact ought also to be stated in this place in regard to the co-operation of veterinary experts in these investigations. Such co-operation was desired, but, as there were no pecuniary means for procuring or properly compensating such persons, and as it was hoped that the entire responsibility in the matter would soon be assumed by the State Commissions, as just mentioned, we early endeavored to give to leading Professors of the New York College of Veterinary Science information of the opportunities to inspect infected cattle. Professors Liautard and Busteded, of the New York College, and Professor Law, of the Cornell University, did witness some of the *post-mortem* dissections. But, as there was soon ascertained that no funds were provided for the State Commissioners to expend upon such inquiries, or for any purpose whatsoever, those medical officers, whom the Board directed to begin the investigations were compelled by circumstances and their own sense of duty to continue the work. Events succeeded each other so rapidly that these officers had to meet the exigencies day by day, and seek such information and do such acts as seemed most important for the Board and the public, or, by neglecting these duties, let the golden opportunity for investigating and restraining the malady be left until some future outbreaks of it, and to allow this opportunity for the hygienic inquiries connected with the malady to pass by unimproved.

The arrival of a badly infected herd of fat beeves by the Erie railroad, on the morning of the 11th of August, while yet no other organization for investigation was in existence, induced the Board of Health to order that this matter should henceforth be placed under the advice and direction of its Sanitary Committee, to do whatever they should deem necessary to represent and discharge all the duties which the public could reasonably expect from the Board in regard to the control of the diseased cattle and the investigation of the whole subject. Subjoined is a copy of the Board's minutes relating to this duty of the Sanitary Committee and associated medical officers:

THE BOARD'S ORDERS FOR ORGANIZING THE LABORS OF INQUIRY.

At a meeting of the Metropolitan Board of Health, held on the 11th of August, and at which reports in relation to the first two infected herds were presented, the following action was taken:

[Copy.]

Resolved, That the Sanitary Committee of the Board be and hereby is empowered to detail expert officers, not exceeding four in number, who are connected with the Board, to act under the orders of said Committee in the investigation of the facts relating to the prevailing *cattle disease*.

The Committee ordered the labors to be organized in accordance with the following instructions:

METROPOLITAN BOARD OF HEALTH, }
August 11th, 1898.

TO E. HARRIS, M. D., *Registrar and Corresponding Secretary, M. B. H.* :

DEAR SIR: At a meeting of the Board of Health, held August 11th, the subject of the prevailing cattle disease was referred to the Sanitary Committee for investigation and report. The Committee was empowered to add, not to exceed four members (who should be officers of the Board), to their own number for such investigation. In pursuance of this power, the Sanitary Committee has selected you as one of the additional members of the Committee.

It is the desire of the Committee that you proceed to organize the work of investigation, and so distribute its several subjects among other members, and control their operations, as to secure the most perfect results.

Yours, etc.,

STEPHEN SMITH, M. D.,
Chairman Sanitary Committee.

METROPOLITAN BOARD OF HEALTH, }
August 12th, 1898.

TO R. CRESSON STILES, M. D., *Deputy Registrar, M. B. H.* :

DEAR SIR: The subject of cattle disease, as it has appeared in the markets in and around New York, has been referred to the Sanitary Committee for study and report. The committee was empowered to add to its number such officers as it deemed necessary, and accordingly it has selected you for the special duty of studying whatever pathological alterations you can discover in the tissues and fluids of the infected animals, and that you will avail yourself of whatever aid the microscope can give in these researches.

You will devote all the time that is necessary for a thorough investigation of the disease, and make full and accurate notes of your observations.

You will also keep in constant communication with Dr. Harris, and follow his directions in your work, unless otherwise directed by the Sanitary Committee.

Truly yours,

STEPHEN SMITH, M. D.,
Chairman Sanitary Committee.

METROPOLITAN BOARD OF HEALTH, }
August 12th, 1898.

DR. MOREAU MORRIS, *Sanitary Inspector M. B. H.* :

DEAR SIR: The subject of cattle disease, as it has appeared in the markets in and around New York, has been referred to the Sanitary Committee for study and report. The committee was empowered to add to its number such officers as it deemed necessary, and accordingly it has selected you for the special duty of studying the symptomology or clinical history of the affection as it appears in the herd-yards.

You will devote all the time to this duty that is necessary for a thorough investigation of the disease, and make full and accurate notes of your observations.

You will also keep in constant communication with Dr. Harris, and follow his directions in your work, unless otherwise directed by the Sanitary Committee.

Truly yours,

STEPHEN SMITH, M. D.,
Chairman Sanitary Committee.

A similar requisition was made upon Prof. Chandler, the Chemist to the Board, for his aid in the necessary chemical analyses, and, at a later date, the duties of Dr. Morris being enlarged by his appointment as Assistant Commissioner for the State, it became necessary for the committee to employ the aid of one of the Assistant Sanitary Inspectors, and Dr. Benjamin Howard was, therefore, selected to render temporary assistance as was required in *post-mortem* examinations, etc.

In carrying this purpose of the Board into effect, Dr. Stiles gave his attention to the special pathological investigations requiring microscopical examinations; Dr. Moreau Morris continued his duties of inspection of the herds arriving at the New York market, and was requested to have charge of the medical observations upon all diseased cattle, and, with Dr. Stiles, to report to the central office daily concerning the progress of the inquiries. To Prof. C. F. Chandler, of the School of Mines, Columbia College, and Chemist to the Board, was committed the chemical analysis of morbid specimens from the diseased animals, and for which duty he thoroughly prepared two of his assistants. The Registrar of the Board, as the medical officer in charge of the researches, organized and pushed forward the inquiries, visited the infected cattle, was present at the post-mortem examinations when possible, and

had the general supervision and control of the work, and was especially charged with the organization and maintenance of the scientific investigations.

It was plainly necessary to have such organized labor, in order to centralize and give efficiency to whatever investigations might be undertaken. The Board needed all the information which could be brought to its central office daily, both for its own use and to satisfy inquiries constantly made in regard to this disease.

THE ARRIVAL OF AN INFECTED HERD FROM INDIANA.

On the evening of August 10th, the Superintendent of the Bergen cattle yards, Hudson City, N. J., applied to Gov. Ward and Dr. Harris, who were then at Communipaw, asking their advice as to the disposal of a herd of 70 or more infected cattle then on the way from Campville—Erie railroad herd-yards—to his sales yards at Hudson City, to arrive next morning. Early next morning, August 11th, Sanitary Commissioner Dr. Stephen Smith, Inspector Morris and Dr. Harris, visited the yards and herd train, near the Hackensack river, where this lot of infected cattle had been switched off from the Erie railroad. Here were seen several fine fat bullocks in a dying condition; and no less than 15 out of this herd, now consisting of 66 cattle, were evidently in a hopelessly diseased state.

For a detailed account of the observations which were made upon this herd, we would refer to Dr. Morris' report upon his department of labor, in a subsequent section. But this group of infected bullocks exhibited the symptoms and pathological effects of this disease with such completeness; and the entire history of the herd itself, the source whence they received the infection, the period of incubation, and whatever else could be a matter of exact inquiry, were such that the Board's officers made great efforts to have these dying cattle made the subject of the most thorough investigation. Arrangements were made for the observation of symptoms and post-mortem evidences; and Governor Ward took the preliminary steps for keeping the entire herd under close observation. Correspondence was immediately opened with the Governor of Indiana, for the purpose of tracing every step and every day of the history of this herd, which belonged to a Mr. Thomas, of Warren county, in that State.

In all that is essential in the history of this herd, these efforts were entirely successful; but, in the absence of all official authority in the town where these cattle were, speculators shipped about 50 of them to parts unknown. Yet five of the worst diseased animals were left for the careful examination of the officers of the Metropolitan Board. This examination will justly be regarded hereafter, as being, in every important respect, among the most valuable of all that were made during the whole series of inquiries of the Board; for there in the open field and in the presence of the quivering flesh of the sick bullocks, immediately upon slaughter, the microscope, under the skillful hand of Dr. Stiles, revealed all the morbid phenomena in blood, bile and tissues, which finally we have come to regard as being characteristic or pathognomic of this strange disease. Dr. Stiles, Dr. Morris and Dr. Harris, spent the entire day, August 13th, in these investigations, and Commissioner Dr. Stephen Smith was present to witness the most important of the autopsies, and verify with his experienced eye, as a Professor of Anatomy, the demonstrations by Prof. Stiles. He witnessed the first demonstration of the reticular structure or arrangement of the ultimate bile-ducts as revealed under Dr. Stiles' microscopes.

To have preserved those morbid specimens in a fit condition for perfect microscopical researches at a later hour, or away from the field, would probably have defeated or long postponed the ends which were achieved that day; for it was necessary to determine what morbid changes in tissues, and what, if any, parasitical organisms, or other morbid elements, could be found actually pertaining to the diseased cattle at the moment of their being killed. The liver, the bile, the spleen, the kidneys, and the blood, the stomachs, the brain and the muscular tissue were each, in succession, examined with great minuteness and care. The nature of the discoveries that were made during that day will be fully explained in Dr. Stiles' special reports, and the colored plates in subsequent sections.

THE HISTORY OF THIS HERD AS AN INDEX TO ALL FUTURE INQUIRIES.

His Excellency, Governor Baker, of Indiana, through Capt. James Park, who served as the agent in the inquiries in that State, and Dr. J. G. Orton, Assistant State Commissioner of New York, and subsequently in charge of affairs at Campville, on the Erie railroad, as soon as the desired inquiries could be made, filled up every link in the history of this herd, and early in September communicated the facts as follows:

(Copy.)

"INDIANAPOLIS, September 4th, 1868.

"E. HARRIS, M. D., *Corresponding Secretary Metropolitan Board of Health*:

"DEAR SIR: In reply to your communication of the 15th ult., making inquiry and desiring information concerning the cattle disease, I have the honor, by direction of the Governor, to transmit herewith a copy of a report made to this department by Captain James Park, of Warren county, Ind., upon the subject. Respectfully,

"JOHN M. COMMONS, *Private Secretary*.

(Copy.)

"WILLIAMSPORT, Ind., August 31, 1868.

"To His Excellency, Governor Baker:

"As requested by your letter of the 23d inst., I herewith transmit such a report of the facts in regard to the "cattle disease" as I think will meet the inquiry of the Metropolitan Board of Health.

"On the 27th day of April, 1868, a herd of 930 of Texan cattle were purchased at Colorado county, Texas. They were driven to the mouth of Red river, a distance of about 600 miles, reaching that point May 31st, 1868.

"They were at once shipped from that point on steamboats, and arrived at Cairo, Ill., June 4th, 1868. From thence they were shipped on the Illinois Central railroad, and reached Tolono, Ill., June 7th, 1868. From this point they were driven into Warren county, Ind., a distance of about sixty miles. They came into the western boundary of Warren county on the 12th June, 1868. There was a loss of forty-four head, only 886 of the 930 head reaching Warren county. These cattle were from four to six years old, all apparently in good condition, nothing indicating any disease whatever. There were "ticks" on very many of them. This herd is still at the present date in Warren county, Ind., all doing well, and no disease whatever having made its appearance among them: not one has died, notwithstanding more than 500 native cattle have died all around them. This herd of Texan cattle on the twelfth day of June, 1868, passed over a certain piece of prairie pasture on the western portion of this county (Warren). On the nineteenth day of June, 1868, a lot of native cattle, numbering ninety-five head, averaging over 1,300 pounds each, were permitted to graze upon the same pastures, and continued to feed upon the same until the fourth of August, 1868. One of the herd was noticed to be sick on the twenty-eighth of July, 1868, and up to the fourth of August, 1868, eleven were sick and three had died. On the fourth of August, 1868, eighty-four of this lot of ninety-five were driven to the West Lebanon Railroad station, on the Toledo and Wabash railroad and shipped for the New York market. This is, I presume, the herd of sick cattle referred to in Dr. Harris' letter. There were eleven head of another lot that had not been on this pasture, or in any way exposed to the Texan cattle, shipped with the eighty-four—none of the eleven head were taken sick on the road to New York, but the sickness was confined to the eighty-four head exposed to the Texan cattle, at least had herded upon pasture passed over by Texan cattle.

"On the night of the twelfth of June, 1868, this lot of Texan cattle herded on another piece of prairie where a lot of 100 head of native cattle were feeding. On the morning of the thirteenth of June the Texan cattle were driven to the north of the country. Fifty-five of the 100 head of native cattle were three years old, the rest were one and two—all in good growing condition. On the night of the twelfth of June, 1868, there were twenty-six head of native fat cattle in an adjoining inclosure to the ground occupied by the Texan cattle. About four weeks after the twelfth of June these twenty-six fat cattle broke out of their inclosure and grazed upon the prairie where the Texan cattle had been on the night of June 12th. On the 29th of July one of these twenty-six was discovered to be sick, and died on the night of July 31st. On the first day of August two of the 100 had died and some twenty-five more were sick. From that time up to the present the entire herd have been taken sick; eighty-eight out of the one hundred have died; twenty-two out of the twenty-six have also died; total, 110 out of 126. The remaining sixteen head have all been sick, and are now very poor and stupid, but have the appearance of getting well.

"As a fact, wherever native cattle have passed over ground where this Texan herd have been, the native cattle have sickened and died. It is also a fact that other Texan cattle have been brought into this county, have been herded with native cattle for two months, and as yet no disease has made its appearance. We have had over 4,000 head of Texan cattle in this county this summer.

"I have the honor to be, very respectfully, your obedient servant,

"JAMES PARK."

Concerning the lot of cattle which Captain Park mentioned as having been shipped from the West Lebanon railroad station on the evening of August 4th, the following note was received from Assistant Commissioner Dr. J. G. Orton, of Binghamton, N. Y., soon after he assumed the duties of his office:

"On the 9th of August last, from a lot of five (5) car-loads of cattle shipped from Buffalo, consigned to J. M. Thomas, and yarded off at Campville for feed and rest, seven (7) had died, it is supposed, from the then prevalent cattle plague.

"Eleven others, exhibiting clearly developed symptoms of the disease, were detained and inclosed in a yard by themselves. These all died in about three days. The survivors went through to Bergen cattle market in the usual course. The 11 diseased cattle, I am informed, all manifested the usual symptoms of the plague, namely, rapid pulse, loss of appetite, head turning or drooping to one side (*torticollis*), discharging mucus from mouth and nose; urine bloody, and, finally, inability to walk or stand alone. As these cases occurred several days previous to my appointment as Assistant Commissioner, I had no opportunity, I regret to say, of making any examination of the bodies. They were hurriedly buried in trenches just outside of the cattle yards."

"Very respectfully yours,

"(Signed)

J. G. ORTON, M. D.,

"Assistant Commissioner of the State."

"BINGHAMTON, Broome Co., N. Y."

It will be noticed, that, in the three separate accounts which we have here given, concerning the herd of farmer Thomas, of Warren county, Ind., there is not only entire harmony in every particular as regards the statistics and movements of this herd, but also as respects the sickness that befell the infected cattle. This herd numbered 84 head, Captain Park informs us, when they left Indiana; they filled five transport cars and part of a sixth (the remaining space of the sixth car being occupied by 11 cattle that had not before been exposed to the disease, says Captain Park.) At the Bergen cattle yards, near the Hackensack river, on the morning of August 11th, Commissioner Stephen Smith, Dr. Harris and Dr. Morris, found 66 cattle, just arrived in the care of the same Mr. Thomas; no less than 15 of this number were then sick. The 11 cattle mentioned as uninfected by Captain Park, and that occupied a part of the sixth transport car, were all living, healthy, and were quickly sold for sound and healthy beeves. Finally, Commissioner Orton's letter shows that 18 out of the 84 cattle which the owner, Mr. Thomas, and Governor Baker's State agent, Captain Park, separately aver to have been exposed to the infection of Texan cattle, died in the course of four days at the Campville herd-yards on the Erie railroad. Of course but 66 survivors remained, and these were hurried onward to the New York market on the 10th of August, and were the next morning seen in the condition just mentioned.

In regard to any or all the points in a record so clear and well stated as this is, no comment can add any thing to the strength of the argument which every intelligent person will discover in it. We would simply call attention to the fact that the record given by Captain Park, concerning the herd shipped from West Lebanon, on the Toledo R. R., the statement given by farmer Thomas, the owner of cattle, who came on with them, and who gave us the information personally, in the yards where his cattle were dying, near Hudson city, and the record of events connected with this herd at Campville and elsewhere, on the Erie railroad, harmonize with and verify each other in every particular. And, it should here be observed, that, in this instance, as in others, to be noticed in Dr. Morris' report, there is ample presumptive proof that owners of infected herds, and particularly the speculators who dealt in such stock, regarded a hurried transportation to the New York market as the shortest and surest way to avoid the losses liable to be incurred by keeping such cattle for a day longer than their circumstances compelled them to keep them.

FIRST CASES OF THE CATTLE DISEASE SEEN IN THE METROPOLITAN DISTRICT.

Two weeks subsequent to the occurrence of these events, it became known to the Board of Health that a small herd, eighteen in number, which had left West Albany July 28th, in charge of Mr. Stephen B. Reynolds, their owner, and which arrived at Peekskill, by the Hudson River railroad, July 29th, and at Sing Sing, by over-

[Senate No. 9.]

land, during July 30th, proved to be infected with the Texas cattle disease. They were Illinois cattle, and had been purchased for immediate home consumption, at Sing Sing and the neighboring villages. Mr. Reynolds sold four to Mr. B. G. Tompkins, a butcher at Sing Sing, and five others to Messrs. Raymond & H. J. Sarles, also butchers at Sing Sing, and four to Mr. Wright Tompkins, a butcher living east of Sing Sing, and the remaining five of this herd Mr. Reynolds drove to his own farm, in the town of Somers, eight or ten miles east from Sing Sing. The circumstantial history of this herd is correctly and briefly given by Dr. George J. Fisher, the Sanitary Inspector of the Metropolitan Board of Health, for that section of the Metropolitan District:

(Copy.)

"ELLIS PLACE, SING SING, }
August 27th, 1888. }

"Dr. E. HARRIS, *Corresponding Secretary and Registrar Metropolitan Board of Health:*

"SIR: I deem it my duty to make a brief report of the facts concerning the introduction of diseased cattle into Westchester county. On the 28th day of July, Stephen B. Reynolds, a cattle dealer, living in the town of Somers, Westchester county, purchased eighteen bullocks of a cattle dealer in Albany, N. Y., being a portion of a lot of cattle said to have come from Illinois. These eighteen bullocks were immediately sent to Peekskill, N. Y., on the cars of the Hudson River railroad, whence they were driven directly to Sing Sing, a distance of twelve miles. On arriving at the latter place (July 30th) the owner, S. B. Reynolds, sold four of the cattle to B. G. Tompkins, a butcher in Sing Sing; five to Charles Raymond and H. J. Sarles, also Sing Sing butchers, and four to Wright Tompkins, brother of B. G. Tompkins, who is a butcher living east from Sing Sing. The remaining five Mr. S. B. Reynolds drove to his own farm in Somers. Within two or three days after their arrival, Raymond & Sarles slaughtered three of their five cattle, and sold the meat in Sing Sing, as they allege, not suspecting the cattle to be diseased, and still believing them to have been sound and healthy at the time they were slaughtered. Mr. B. G. Tompkins also slaughtered one of his four cattle about the same time, and sold the meat in his market; his butcher says he did not observe any thing to be the matter with the bullock, and believes that he was not diseased.

"The first thing which aroused the suspicion of the butchers was, that, on the 4th of August, S. B. Reynolds brought to Sing Sing, and offered for sale to the butchers, the quarters of one of the bullocks which he had driven to his own farm, and stated to the Sing Sing butchers that the bullock was found cast, in or near a brook in his pasture, and supposing the animal had received some mechanical injury, slaughtered it and brought the meat to Sing Sing for sale. He first offered it to B. G. Tompkins, who refused to purchase it; next to H. J. Sarles, who also declined buying it, after which he took it to Croton (where a number of laborers were engaged in brick laying), but finding no purchasers, he returned to Sing Sing, and asked Sarles to allow him to leave the hind-quarters in his ice-room; this being granted, he took the forequarters to the camp-meeting grounds and offered to sell them to Mr. George Worden, the only person authorized to sell meat to the camp-meeting people, who also declined purchasing the meat.

"While Reynolds was yet engaged in seeking a purchaser for his 'injured beef,' Mr. William Dubois, a farmer, two miles north-east of Sing Sing, came to the village and informed G. B. Tompkins that one of his cattle was dead, and the remaining two were sick on his premises, where they had been driven after they were purchased of Reynolds. This information at once convinced the butchers that they had diseased cattle on their hands, and that Reynolds' beef, which he had been hawking about, and fortunately had found no customer for, was 'diseased meat,' and that this bullock had been cast by the plague and not by accident. Sarles immediately took the responsibility of having the hindquarters of Reynolds' beef taken from his ice-room and thrown into the mouth of the Croton river, and immediately informed Reynolds of the course he had taken, whereupon Reynolds buried the remaining forequarters in the offal heap at Reynolds' slaughter yards, a mile east of Sing Sing, and thus the diseased meat was disposed of.

"I have now accounted for five of the eighteen cattle; the remainder are accounted for as follows:

"August 3d. One died at Dubois' farm, belonging to B. G. Tompkins (already mentioned).

"August 6th. Wright Tompkins found two dead in his field, and S. B. Reynolds found one nearly dead and had it killed for post-mortem examination by Mr. Edward Underhill, a scientific farmer and an expert.

"August 7th. Another died at Dubois' farm, belonging to B. G. Tompkins.

"August 8th. S. B. Reynolds found another bullock dead in his field. B. G. Tompkins killed the last of his four, for examination by Dr. Collins and myself. The bullock was nearly dead before he was knocked in the head.

RECEIVED

"For the remaining six I cannot account. S. B. Reynolds and Wright Tempkins each two of them. Whether they are sick or well, dead or alive, I cannot tell.

"The two which were sick and remaining in possession of Raymond & Sarles, are said to have been given (August 19th) to William Elliott, a cattle dealer at Putnam county. *

"Yours respectfully,

(Signed)

"GEO. J. FISHER, M. D.,

"Assistant Sanitary Inspector M. B. II."

These extracts from evidence on file at the chambers of the Metropolitan Board of Health are introduced in this place to show the actual state of affairs connected with the movements and handling of infected beeves within the Metropolitan district. Prudential considerations, and a due regard for the mental tranquility of the people, made it expedient to say and do those things only which would restrain the movement of infected cattle, and utterly prevent the sale of the beef and viscera of the dying animals in the markets. These two great objects, we have every reason to believe, were accomplished very completely.

ORGANIZATION OF THE NEW YORK STATE CATTLE PLAGUE COMMISSIONERS.

On the 18th of August the State Commissioners, Messrs. Patrick, Gould and Allen, having assembled at Albany, organized a suitable plan for the inspection and control of diseased herds wherever found within the State, and, as soon as their instructions had been promulgated, viz., on the 19th of August, the committee in charge of investigations for the Metropolitan Board of Health offered to make over to that Commission all results and resources then at its command. But, as was ascertained by them in the course of a few days, there were no funds at the command of the Commissioners that could be made available for carrying on such investigations. Moreover, the Commissioners expressed in very decided terms their approval of the labors in progress under the Board of Health, and of their preference and desire that the Board should independently carry forward all the inquiries which its officers had begun. Hence the Board's committee saw no other course than that which they had commenced upon. But they earnestly invited the co-operation and advice of the Commissioners. From the organization of the Commissioners until now there has existed an entire and hearty unity of effort between them and this committee of the Board.

THE LABORS OF SANITARY INSPECTOR MORRIS AS ASSISTANT COMMISSIONER FOR THE STATE.

During the first session of the State Commissioners, August 18th, they appointed Dr. Moreau Morris as their assistant for the Metropolitan District. As they had immediate occasion for expert inspection by him at Millerton and Copake, in Dutchess county, Dr. Morris proceeded thither to make the desired observations and give the necessary orders. The circumstances attending the appearance of the Texan cattle fever in Messrs. Smith's herd of western bullocks, *en route* overland from Albany, as detailed by Dr. Morris, are full of instruction concerning the subtle course of the infection, and the usefulness of restrictions against the movement of infected cattle. The prompt action which was taken by Dr. Morris in regard to the isolation and restraint upon all movements of that infected herd had a very wholesome effect upon the public mind, in allaying anxiety, and upon the speculators and shippers of damaged cattle, in restraining them from such traffic.

It is no part of the design of this report to enter upon an examination of those abuses and frauds of the cattle trade, by which our meat markets are continually exposed to the sale of diseased and injured beef, but there are a few points in regard to this matter which, as a Sanitary Inspector of the Metropolitan Board of Health, Dr. Morris investigated, in the course of his inspection of the herds and butcheries,

* A citizen of Sing Sing has since reported to this committee that these two sick beeves were sent down to our city markets.

before he went up the railroad to Millerton to arrest the movement of the sickly herd which is here mentioned. He had obtained evidence of the fact that sick cattle, when discovered in the herd-yards, are sold, slaughtered and pushed forward to the meat-stalls of the markets as speedily as possible, and that this perilous business was last summer, and it usually has been in all probability, so adroitly managed, that, with the exception of the infected cattle found near Sing Sing by Dr. Fisher, no Inspector of the Board of Health had succeeded in finding any animal affected with the Texas cattle disease within the Metropolitan District previous to August 17th. Ample proof has been obtained that several cases of this disease had been witnessed by the herdsmen in the city of New York during August, and previous to the date here mentioned. Inspector Morris carried out in the most admirable manner the views which the Board of Health had authorized and directed its committee to publish on the 13th of August. And in the telegraphic orders which he received from the President of the State Commission he was "empowered and directed to carry out the suggestions of the Sanitary Committee as published in the New York papers."

Combining, in one competent and already thoroughly experienced sanitary officer, the functions and authority of an Assistant Commissioner for the State and the duties of a Sanitary Inspector under the Board, as was happily accomplished in the service of Dr. Morris, the proper inspection and police of all herds and herd trains, and the timely care of all infected cattle, became certain. To provide for the constant inspection and sanitary supervision of the great herd-yards at One Hundreth street—the chief market for beeves in New York—he appointed Mr. Dayton, and with him he conferred daily at the yards; and to meet the exigencies that might continue, until frost, in regard to the sales yards on the New Jersey side, he appointed Mr. Taylor for Communipaw, and Mr. Newkirk for Hudson City and Hoboken, who, as the commissioned Inspectors under authority of the State of New Jersey, and as commissioned agents for the State of New York under Dr. Morris, reported to him all their transactions daily. Other inspectors and one expert detective were also employed by Assistant Commissioner Morris in New York. With this simple and readily managed organization, that officer has continued to maintain a sufficiently rigid and searching espionage upon the condition and movement of all cattle in the two cities. The Board's officers have, of course, given him whatever aid they could, and so, likewise, has the sanitary company of the Metropolitan Police; yet, it is due to this faithful and untiring Assistant Commissioner that the fact should be stated in this place, that, to his hearty devotion to the interests which the Board of Health required him to guard, and to his fearless and prudent discharge of his functions as an officer for the State, is largely due the successful execution of the plans of the Board for both controlling and investigating the disease. He made it an invariable rule, personally to inspect every infected herd, and firmly to apply the sanitary regulations which were advised by the Board and by the State Commission. The methods and regulations which were adopted in his service are set forth in his report. It can with truth be stated, that, in the administration of the duties of his position, he convinced all classes of men of the justice and good judgment of his acts. With habits of accurate medical observation, and with the trusty self-registering thermometer in his hands, he avoided error in his diagnosis and judgment concerning diseased cattle, and in every way he proved how vastly superior is the exact knowledge of the physician over the merely empirical kinds of knowledge and judgment to which the diseases and sanitary control of herds are usually committed.

THE DUTIES OF DR. R. CRESSON STILES AS PATHOLOGIST AND MICROSCOPIST IN THIS INQUIRY.

The two papers that are submitted in this report by Dr. Stiles sufficiently explain the nature of his duties in connection with the investigations. But the actual amount of toil and care, the expenditure of time and study, the patient manipulation of specimens under his excellent microscopes, and the nice analysis of what-

ever pathological or other physical conditions were essential or constant in the diseased cattle, severely taxed the well sustained enthusiasm which he has for years displayed in the cultivation of physiological and pathological knowledge. He was present at the first series of post-mortem inspections, with his microscope and re-agents, close by the dying and freshly bleeding bullocks; for it was from the first deemed vitally important to exclude all possibilities of studying abnormal conditions of tissues and fluids that might, after all, be merely post-mortem changes. He therefore attended at the slaughtering and post-mortem inspections as often as he could; and, when absent from them, the specimens to be examined, microscopically and otherwise, by him, were carefully inclosed in stoppered glass vessels, the stopper being washed with cresylic acid, and the specimens, thus guarded, being forthwith forwarded to him.

The scientific investigations which the Board of Health has encouraged the Registrar and Deputy Registrar to pursue during the past three years, rendered it easy for these officers to undertake a certain amount of inquiry in regard to this cattle disease, but, had it not been for the unusual qualification of Dr. Stiles, the Deputy Registrar, for the pathological researches which were required, all the good purposes and desire for thorough investigation of the essential nature, causes and morbid phenomena of the cattle plague, would have enabled the Board and its medical officers to add but very little to the stock of useful knowledge. The Registrar states this fact with gratitude, and without in the least depreciating the value of any labors performed by other officers of the Board.

This labor of Dr. Stiles has been continued from the 9th day of August to the 1st day of December; the first being the commencement of examinations in Mr. J. T. Alexander's infected herd, at Communipaw, and the last being an examination of morbid specimens from two diseased Texas cattle that were taken off a train at Buffalo, and carefully dissected by Assistant Commissioners Morris and Mackey, in the presence of the State Commissioners.

Bringing to these patient researches a well trained mind, with excellent experience and skill in the analytical study of healthy and morbid conditions of the animal organism, Dr. Stiles' aid in our investigations has been of the most indispensable character. And it must be regarded as particularly fortunate, that, in the absence of means for employing a special corps of anatomists and pathologists, the Board could obtain and use such skill as that of the gentleman here mentioned.

THE AID OF CHEMISTRY IN THE INVESTIGATION OF THE DISEASE—PROFESSOR C. F. CHANDLER'S LABORS.

The excellent example of the Royal Commission in England for investigating the rinderpest in 1865-6 warranted the hope that analytical chemistry might bring out more definite results from the Texas cattle disease than had been attained even in the English researches. But, as we were dealing with a blood disease that had a much longer period of incubation of its infectious cause than the rinderpest has, and which also produces very decided alterations in the proximate and elemental constitution of the liver and some other viscera, it was thought best to submit the blood, bile and urine to the most exact analyses, in accordance with plans somewhat different from those which Dr. Marcet, the chemist to the Rinderpest Commission, pursued. Prof. Chandler has sufficiently explained the methods he pursued in a note appended to the tabulated results which we present in this report.

Very great care was exercised in the taking and sealing of morbid specimens for chemical analysis, and the aid of chemistry was especially invoked in the cases that most emphatically declared the symptoms and uncomplicated phenomena of the disease. Wherever it was practicable Prof. Chandler attended in person at the *post-mortem* examinations, and with his own hand took the specimens and sealed them for his laboratory. In all cases the analyses were made as soon as possible after the specimens were taken.

Out of the whole number of these analyses Prof. Chandler has selected for tabulation in this report only those in which his success in the entire process of treat-

ment was most thoroughly perfect and unequivocal. By referring to the section in which these results are tabulated it will be seen that there are fourteen (14) specimens of blood, nine (9) specimens of bile, four (4) of serum from the abdominal cavity (cases in which ascites and copious effusion had occurred), four (4) analyses of urine (black-water), and four (4) analyses of the liver.

The exceeding nicety and skill which are required in the analysis of blood and bile were appreciated, and provided for by Prof. Chandler and his very skillful assistants in the laboratory. And, notwithstanding we did not at first venture to hope for any positive results from chemistry to aid in the pathological investigation which the Sanitary Committee of the Board of Health required to be made, it now is found in the final summing up that almost any other element in the pathological study could be spared or omitted—microscopy alone excepted—rather than to now omit the results that chemistry has independently contributed. We say independently because the chemist was requested to ascertain all the essential constituents of the specimens submitted to him, and permit no errors or loss in his quantitative estimation, regardless of any ideas he might entertain concerning the disease.

We have requested the Professor to append the results of the analysis of healthy bullocks' blood, as analyzed in his own laboratory, and also to place at the foot of his table of analyses the mean of all the results in the analyses of blood from fourteen healthy bullocks, also the results obtained by Wm. Marcet, Esq., for the English Commission in 1866.

It is hardly necessary to state to medical men, but it must be remarked for non-medical readers of this report, that the chief objects to be attained in all these analyses by the chemist to the Board were, first, to ascertain what changes in the proximate elements of the blood are found to characterize the disease, particularly as regards waste and deficiency in its solid constituents, and to point out what elements are so effected; second, to ascertain the state of the serum found in cavities of the diseased cattle; third, to ascertain in what respect the bile and the urine differed from those fluids in healthy animals; and, fourth, to ascertain the actual chemistry of the liver, and particularly as regards the percentage of fat in it in the chronic cases of the disease. In all this work chemistry is the aid and verifier of deductions reached by the different methods of microscopy and medical observation. Finally, in regard to the merit of Prof. Chandler's labors in this matter, we feel warranted in stating, that, for accuracy and definiteness, we know of no other series of analyses of bullocks' blood, and of the other elements of the body in disease, that exceed the accuracy of the results which the chemist to the Board now contributes to this report.

THE SKETCHES OF MORBID ANATOMY BY MR. KOEHLER.

This work was begun on the 10th of August, the artist being conveyed to the place of slaughter, and, in all cases, when possible, completing his sketches in colors immediately upon slaughter and dissection. With but one or two exceptions, the specimens that are used to illustrate the chapters on pathology in this report, were sketched in this manner *when perfectly fresh and before any post-mortem change, even in appearance, could have occurred*. The artist was strictly ordered to permit no deviation from nature in his sketches and colors. He has executed his task with exceeding faithfulness.

This artist, Mr. Robert Koehler, enjoys a just reputation for rare excellence in regard to truthfulness in anatomical delineation and coloring. His professional life having been spent in this kind of work, and Prof. Karl Bock's celebrated Atlas of Human Anatomy having been illustrated by his hand before he came to this country, he has continued to receive in New York the same confidence and patronage of the anatomists and pathologists that he enjoyed at Leipzig, where he was the assistant to Prof. Bock. As the value of these colored sketches of morbid anatomy of the Texas disease in cattle must depend upon their truthfulness and the freshness of the specimens they are made to illustrate, this introductory note is due to the Committee's report, and to Mr. Koehler, the artist.

SUMMARY OF THE EVENTS AND THE PROGRESS OF INVESTIGATIONS IN REGARD TO THE DISEASE.

As the details of all that relates to the arrival, inspection and care of infected cattle are embodied in Assistant Commissioner Morris' report in the succeeding section, we need only state here, that, in the prosecution of the Committee's duties in regard to the diseased cattle, it was necessary to give all possible aid to Dr. Morris in providing for the slaughter and *post-mortem* examination of the cattle he condemned and ordered to be killed, or that were permitted to linger in quarantine until they died. It has also continued to be necessary, until December 1st, to maintain extensive correspondence to ascertain the history of herds, and their movements connected with the manifestations of the disease; and it has also daily been necessary to take counsel together upon the results of these inquiries and the new events in the progress of the disease. Happily the contagious principle, upon which the disease depends for its propagation in the North and West, has proved to be capable of repropagating itself only in a very limited and subtle way; but the very circumstance of this subtlety of the contagion has rendered it the more necessary to push on our inquiries and experiments the more assiduously while opportunity has been afforded. All of this labor may be briefly summed up as follows:

1. Every example of the disease within the reach of the committee of the Board of Health or Assistant Commissioner Morris has been promptly investigated, and, if the bullock was not recovering, the slaughter for *post-mortem* examination of the animal was provided for, or, if already dead, the proper expert inspection was made by two or more officers of the Board, Assistant Commissioner Morris being one of them — the total number of infected cattle and diseased carcasses so inspected and examined between the dates of August 9th and December 1st being between 200 or 300. Upward of forty (40) infected bullocks have been slaughtered, and very minutely examined by this committee in a definite and scientific manner.

2. Unceasing effort has been made during a period of nearly four months to discover and inspect every animal suffering from the Texas disease within the Metropolitan District. Assistant Commissioner Morris, during this period, has inspected many thousand cattle, and he sought the counsel and aid of this committee daily.

3. All cattle found dead or dying, from unknown or suspected causes, in the city of New York, have been carefully inspected, and their internal organs examined under the direction of this committee.

4. By an arrangement with the Superintendent of the New York Rendering company, a corporation that has the contract for gathering and disposing of all dead animals from the city, the dying and dead cattle that were daily conveyed to the rendering dock were reported and examined. In like manner all information received by the Superintendent there was at once communicated to this committee of the Board of Health.

5. Whenever a creature was found with this disease the symptoms and progress of it were reported twice daily, and, if brought to slaughter, all necessary preparations were made beforehand for taking and preserving specimens instantly upon killing the animal. No specimens were deemed suitable for analysis and for the artist's sketching unless obtained immediately at death, and brought under such study without delay.

6. A system of experiments to test the morbid effects of bile, liver and muscular tissue, used with food, was made under the care of Dr. F. J. Randall, an Assistant Sanitary Inspector connected with the Registrar's office. Dogs, rabbits and mice were the animals experimentally fed in this way. Other experiments also were made to ascertain the modes in which the infectious principle of the disease might be made to produce its morbid effects in healthy animals.

7. A series of special inquiries was made to ascertain the existence and nature of this disease in freshly arrived Texan cattle; also preliminary inquiry upon this point, by extensive correspondence, was made before any of the Texan stock came under inspection of this committee and the Sanitary Inspectors. The first of our inquiries upon this subject were addressed to Dr. J. H. Rauch, the Sanitary Super-

intendent of Chicago, and Prof. John Gamgee. After the lapse of about ten days both these gentlemen replied by letter, the former from the Chicago stock yards, under date of August 22d, and the latter from Kansas City, under date of August 23d, assuring us that the disease had been found by them, respectively, in the Texan cattle at those places. Subsequent opportunities in New York enabled the Sanitary Inspectors to verify the correctness of the conclusions that had been communicated to us by Dr. Rauch and Prof. Gamgee.

8. Experimental culture (by "planting") of the spores of the morbid bile and blood of the infected cattle, was commenced in September and continued until December, for the purpose of ascertaining the true nature of the fungus from which the spores are derived, that is, to ascertain the botanical characteristics and parasitical history of the cryptogam to which the spores that are found in the blood and bile belong. The chief results of these experimental researches are concisely presented by Dr. Stiles in the second part of his report.

9. By correspondence and inquiry, effort was made to ascertain if the contagium of the Texas disease is propagated, even occasionally, by the native northern cattle. And, quite unexpectedly, contrary, at least, to very positive assertions, as well as to the general rule, instances were found in which the disease has been transmitted by native cattle.

10. Finally, the evidences of health and disease have been very carefully studied by Dr. Morris, ever since his labors commenced in August, and by several Sanitary Inspectors, during the latter part of autumn, and, as far as time would permit, every week since the Texas cattle disease appeared in the vicinity of New York.

II.

REPORT UPON SANITARY INSPECTION, REGULATION AND MEDICAL OBSERVATION OF THE TEXAS CATTLE DISEASE, BY MOREAU MORRIS, M. D., SANITARY INSPECTOR METROPOLITAN BOARD OF HEALTH AND ASSISTANT COMMISSIONER OF THE STATE.

RECORDS CONCERNING HERDS OF DISEASED CATTLE THAT HAVE COME INTO THE METROPOLITAN DISTRICT, OR UNDER THE OBSERVATION OF SANITARY INSPECTORS OF THE METROPOLITAN BOARD OF HEALTH.

To the Committee of the Metropolitan Board of Health, for investigating the Texas cattle disease, and the State Commissioners for the prevention and control of cattle plagues:

GENTLEMEN: For more than four months my time has been exclusively occupied with the observation, inquiries and sanitary regulations relating to the Texas cattle disease, within the Metropolitan District, and wheresoever you directed my services.

My report to you consists mainly of records. They are records of events so interwoven with matters of historical interest concerning this disease, that it seems advisable to present this statement of my labors so consecutively as to be both complete in itself and entirely convenient for reference from other branches of your reports respectively. It seems impossible, in reporting to you the details and results of these labors, so to discriminate the particular duties that were performed by me as an officer under the Board of Health, from the duties which I daily performed under the authority of the State Commissioners, and the special statutes relating to the cattle plagues, that it would be difficult for me to make a full and correct report, concerning either the former or the latter class of my duties, without, at the same time, actually recounting the entire history of events during this period of service; consequently this report is respectfully addressed both to the Board of Health and to the State Commissioners. Were I to report to your honorable Boards separately, the two reports would be in every respect identical in substance.

In making this report, the following order will be observed:

1. The date and leading events in the duties of each day.
2. The record of whatever observations were made in the inspection of cattle, together with an account of whatever sickness occurred, among the herds from day to day.
3. Such arrangement and classification of particular portions of these records as may be necessary for the convenient study of events connected with the disease.
4. Observations upon other kinds of diseased cattle in the New York beef market.
5. Remarks upon evils which were restrained and controlled, and upon sanitary measures concerning cattle and beef in the New York market.
6. What is designed, and what should be accomplished by sanitary inspection and control, in regard to animals and meats offered in the Metropolitan markets.
7. What conclusions and results have been reached in my observations and experience in this work.

So far as the legal authority and influence of the Board of Health could be made available to meet the exigencies which occurred in consequence of the Texas cattle disease, the Board promptly exercised that power and wielded that influence. The State Commissioners for the suppression of cattle plagues have acted in the same spirit as that displayed by the Board of Health.

But it is a fact which seems to demand the attention not only of your Commissions respectively, but also of the Chief Executive and the Legislators of the State, that all the powers and the methods for procuring the needed sanitary inspection and control of market cattle and meats have been only temporary expedients. Systematic and skilled inspection, under adequate laws of the State, should be established as an essential branch of sanitary government.

On the evening of the 8th day of August, 1868, I received the following letter, directing immediate investigation and report upon the facts;

(Copy.)

E. B. DALTON, *Sanitary Superintendent Metropolitan Board of Health:*

DEAR SIR: Dispatches from Chicago indicate the existence of a cattle disease in the West, and intimate that some of the infected stock are on the way to this city, if indeed they are not already here. In the absence of other Commissioners, Mr. Manniere and myself agree, without delay, one of your Inspectors should be directed to repair to the districts where western cattle are received, and to ascertain and report all the facts. It will require tact in the performance of this duty, doubtless, to find out any thing in relation to this matter, as the interests of the butcher are all against any development of facts showing the presence of diseased cattle.

Yours truly,

GEO. B. LINCOLN, *President.*

(Signed)

Upon this letter from the President of the Board of Health, was the following indorsement:

(Copy.)

OFFICE SANITARY SUPERINTENDENT,
METROPOLITAN BOARD OF HEALTH,
August 8th, 1868. }

Respectfully referred to Sanitary Inspector Morris for immediate investigation and report, in writing or by telegraph, if any facts be discovered which require it.

(Signed)

E. B. DALTON,

Sanitary Superintendent Metropolitan Sanitary District.

I immediately visited the National drove-yards located at 100th street, between 3d and 4th avenues. There were but few cattle present, and found none sick.

The next morning visited the same yards again, and finding none sick I joined the President of the Board, Drs. Harris and Stiles in a visit to the abattoir at Communipaw, where Mr. J. T. Alexander's infected cattle, which Dr. Harris had examined the previous day, were being slaughtered and thrown into the rendering tanks.

Here we found that 141 of Mr. Alexander's herd, which had left Homer, Ill., on the evening of the last day of July, were being sacrificed at the rendering tanks in

order to avoid all risks and public injury that might result from keeping them for sale in the market yards.

A large number of these cattle were evidently sick, as indicated by the following symptoms:

Attitude. An arched or roached back, head carried low down, ears drooping, eyes staring with a dull, glassy appearance, gait tremulous and staggering in the hindquarters, the feces hard, streaked with blood, urine copious and bloody in appearance (*hematuria*), pulse, in the most marked cases, was found to be at about eighty, thready, and in some of the animals almost imperceptible, the respiration in one marked case was found forty in the minute, auscultation of the chest furnished no abnormal signs, the temperature of the rectum in some of the most diseased was found to be 107° Fahr.

A bullock in the last stage of the disease was slaughtered for thorough dissection, which was made by the medical gentlemen present. The following morbid appearances were noticed: The gastro intestinal mucous membrane was marked by numerous ecchymotic patches, bile in abundance was found in the small intestines, the bladder was filled with bloody urine, the blood in a fluid condition and imperfectly drained from the larger vessels, the muscles of a dark mahogany color and unlike that of any normal and healthy flesh. Specimens of the morbidly affected tissues and fluids were taken by Drs. Harris and Stiles for analysis and microscopical examination.

Less than fifty of these cattle were slaughtered on this day (Sunday, the 9th of August), and, by appointment, the medical officers who were present agreed to meet on a subsequent day and continue their dissections.

On Monday, August 10th, visited the slaughter house located in 45th and 47th streets, near East river, found no sick cattle or diseased meat. Visited the Bergen cattle yards in company with Assistant Inspectors Howard, Wadsworth and Winslow, where we found several hundred cattle, but none of them exhibited any signs of the disease; thence we went to Communipaw, where the slaughtering of Mr. Alexander's infected herd was in progress.

Mr. Lincoln, of the Board of Health, Gov. Marcus L. Ward and Dr. Harris were there by appointment for consultation. Several diseased cattle were inspected at slaughter; the temperature ranged from 107° Fahrenheit down to 102°.* Information was received that evening that a herd of infected cattle belonging to a Mr. Thomas would arrive at the Bergen cattle yards. Early the next morning (August 11th), accompanied by the Sanitary Commissioner, Dr. Stephen Smith, and the Registrar of the Board, I visited the Bergen cattle yards just mentioned, and there saw some fifteen sick bullocks of the herd of sixty-six that had arrived at that place from Warren county, Indiana. A full history of this infected herd being embodied in the committee's general report, I need not repeat any portion of it here.

Four of these Indiana cattle were carefully examined as to symptoms. The following points were noticed:

*I owe it to the State Commissioners to remark here that I have occasion to refer to the temperature records connected with my inspections of diseased cattle almost daily.

With much satisfaction and a justifiable pride, as regards the advanced and very practical application of the exact science of medicine and hygiene, I beg leave here to state the fact that soon after the organization of the Metropolitan Board of Health, in 1866, Dr. Harris, the Registrar, furnished its library with the latest and best treatises on those epizootics and other diseases of animals used for food, and requiring the attention of sanitary officers, and that his office, which is a Bureau of Hygiene as well as of Vital Statistics, has always been kept supplied with self-registering thermometers to aid in the diagnosis and study of disease when required. In all their inspections the officers engaged in the study of the cattle disease have never failed to have with them their self-registering thermometers, as trusty aids to ready diagnosis. To Dr. Harris, for his thorough knowledge of hygiene and the collateral sciences, and to his habits of organization and thoroughness in the investigation of causes and results of disease, is mainly due the credit for the completeness of all this investigation and study of the Texas cattle disease.

General external appearances. Coats rough, heads hanging low down, eyes staring and dull, ears drooping, gait staggering, with tremor of flank muscles, feces hard, small, covered with bloody mucous, urine dark and bloody, pulse 116 per minute, soft and feeble, respiration rapid, temperature at rectum 104° to 109° Fahrenheit. From one of these sick bullocks bloody mucous was issuing from the nostrils. Three of the cattle were suffering from delirium, and, though apparently frantic, were too feeble to do injury; they stood pressing their heads firmly against each other or against the fence, their nostrils resting on or near the ground. The first figure seen on the right of plate No. 1 shows the appearance presented by the feeblest one of these delirious cases. The sketch was taken on the spot on the 13th of August.* The muscles of the neck in one of these animals were exceedingly rigid on one side and relaxed on the other, producing a kind of torticollis. The top of the head and base of the horns had an excessively high temperature. Professors Busted and Liautard, and others of the Veterinary College of New York, having arrived during this examination and requested the privilege of selecting one of the sick animals for their own experiments, they were cheerfully permitted to take their choice.

Mr. McPherson, the superintendent of the yards, volunteered the information that the residue of the infected herd were securely isolated in a pasture near by, where they would be kept until the authorities of New Jersey decided what should be done with them.

August 12th. In company with Dr. Harris and Sanitary Commissioner Dr. Stephen Smith, visited the Bergen cattle yards. Eleven head of sick cattle, from Thomas' herd, were selected and placed in quarantine for observation. Three of these being very ill, temperature records were taken as follows:

No. 1. Mooley, at 2 P. M. 107½° Fahrenheit scale.

No. 2. Brindle, at 2 P. M. 105° Fahrenheit scale.

No. 3. Speckled, at 2 P. M. 107° Fahrenheit scale.

Three others were in small yards, belonging to the same herd, one of which had a temperature of 110°.

The fifty head, balance of the drove, were said to be placed in quarantine pasture near by, but were, in fact, surreptitiously removed, no positive trace of them having yet been discovered.

On August 13th I received instructions from the Board of Health, through the chairman of their committee on cattle disease, to co-operate with that committee and to give my time to the "special duty of studying the symptomatology and clinical history of this affection, as it appears in the herd yards. These instructions directed me to devote all my time to this duty, to make accurate notes of my observations, and to follow the directions of Dr. Harris, in my work under the committee."†

On the same day visited Bergen cattle yards in company with Prof. S. Smith, Sanitary Commissioner, and Drs. Harris and Stiles, all of the Metropolitan Board of Health, and Prof. Liautard, of the Veterinary College of New York, Gov. Ward, of New Jersey, and Mr. Kohler, the artist. On arriving at the yards, discovered that but four remained of the eleven placed therein the day previous. The other

* The signs by which the disease was characterized were deemed of sufficient importance to warrant the sketching and exact illustrations of them by a good artist. This forethought of the committee was certainly very fortunate, for, notwithstanding the very extensive prevalence of this disease in the West and elsewhere, these sketches which the Metropolitan Board of Health has preserved are believed to be the only series in existence that is at all complete.

† This promptitude of action by the Board of Health, in meeting whatever exigencies arise, has proved the surest means of preventing popular anxiety as well as protecting the public health. It has justly been remarked by one of the officers of the Board, that "experience in the Metropolitan district has abundantly proved that the best way to prevent both pestilence and panic is to know and prepare for the danger." (Notes on Cholera Prevention, addressed to Jackson S. Shultz, President Metropolitan Board of Health. By Dr. E. Harris.)

seven had either died or been slaughtered, and removed, it was said, to the rendering tanks.

Those remaining being in a dying condition, were immediately slaughtered, and post-mortem examinations held. Dr. Harris, who directed the scientific investigations, had the following observations made:

No. 1. *Mooley*, weight estimated 1,500 lbs. gross. Blood flowing from the carotids; temperature $106\frac{1}{2}^{\circ}$ Fahrenheit; fat very yellow, jaundiced; muscles dark mahogany color; liver very large, fatty, weight $23\frac{1}{2}$ lbs., softened; spleen very large, engorged with dark blood, weight 9 lbs. 2 oz.; kidneys dark color, congested, weight 4 lbs. 6 oz.; heart, muscular tissue softened, weight $5\frac{1}{2}$ lbs.; gall bladder distended, filled with dark, thick, flakey bile, weight 3 lbs. 10 oz.; bile sp. g. 1.030, temp. 86° F.; urine dark, bloody, about 1 qt. sp. g. 1.035; colon, inner mucous coat highly congested, with blood along the longitudinal rugae; small intestines the same as colon; rectum intensely congested, rugae; bladder, inner coat covered with bright red puncta; lungs healthy, right weighed 7 lbs., left 4 lbs.

No. 2. *Brindle*,* in a dying condition, slaughtered. Temperature of rectum 106° ; mouth $106\frac{1}{2}^{\circ}$ F.; nostrils hot, moist, tongue pointed and retracted; blood of aorta at slaughter 106° , sp. g. 1.039; fat very yellow or greenish yellow color; muscles dark red mahogany color; liver enlarged, softened, fatty, weight $27\frac{1}{2}$ lbs.; spleen engorged, softened to a pulpy mass, weight 9 $\frac{1}{2}$ lbs.; kidneys very dark, weight $4\frac{1}{2}$ lbs.; heart, muscular tissue softened, 6 lbs.; gall bladder distended, with thick, dark, flakey bile; bladder distended, with about 2 quarts of a dark bloody urine, sp. gravity 1.030, inner coat of bladder covered with bright red puncta; small intestines injected with bloody puncta; rectum highly congested in longitudinal striae along the rugae; caecum, inner surface covered with large ecchymotic spots; omasum, its leaves inflamed, dry, and contents hard; abomasum highly inflamed, ulcerated in its pyloric extremity; posterior nares slightly injected with bloody extravasation; brain slightly congested; lungs healthy, right, $5\frac{1}{2}$ lbs., left, $4\frac{1}{2}$ lbs.

No. 3. *Speckled*, gross weight 1,150 lbs. Temperature of rectum 107° F. In a dying condition. Slaughtered. Blood of aorta, temperature $107\frac{1}{2}^{\circ}$ Fahrenheit; liver enlarged, engorged with blood and softened; gall-bladder distended, with thick, dark bile; rectum, caecum, and small intestines highly injected with blood, forming striae and ecchymoses along the margins of the rugae; abomasum highly congested, inflamed, and the pyloric extremity presenting large dark ulcers; kidneys dark color, congested; bladder filled with dark bloody urine.

August 14th. Visited Communipaw. The five cattle that were reserved for observation and treatment, through the kindness of Mr. Fitch and the Supendent, Mr. Payson, were this day placed in a lot where they had access to salt meadow grass, and were compelled to drink of the following mixture which Dr. Harris had prescribed as an experimental remedy:

Carbolic acid, 12 oz. in crystals,	} Mix.
Glycerine, 4 "	
Bicarb. soda, 12 "	

Directions: Dissolve or mix one ounce in 3 or 4 gallons of water.

This was readily drank by the steers.

The surface of the ground was liberally sprinkled with heavy oil of coal tar mixed with sawdust.

August 15th. At Communipaw. The five cattle under treatment appeared evidently improving; they drank about two gallons of the medicated water during the past 24 hours.

An ox which had been in the same yard with the infected herd was found dead in another yard. He was examined by the State Inspector, Mr. Henry Taylor, of New Jersey, and presented the same lesions as had been observed in the cattle dying of the cattle disease in Mr. Alexander's herd, viz.: "Dark yellow brownish fat, muscles very dark red, bloody dark urine, enlarged liver, gall bladder filled with thick dark bile."

August 16th. This day at Communipaw. One of the five under treatment was slaughtered for scientific investigation. The balance (4) appeared to be convalescent.

Temperature 102° . Post-mortem: Urine, clear, normal, sp. g. 1.020, acid. Spleen, somewhat enlarged and engorged. Liver, 11 lbs., somewhat softened. Fat, very yellow. Kidneys, slightly engorged, paler than normal. Abomasum, mucus coat slight spots of congestion. Rectum, congested along the rugae.

* The appearance presented by the carcass of this animal is shown in plate 2, which was sketched by the artist as soon as the viscera were removed after killing the bullock. See plate 2.

August 17th. Visited National Drove Yards, 100th street and 3d avenue. Found an ox lying sick, unable to rise; temperature 106°; breathing very rapidly, panting, pulse too soft and rapid to count. No owner or claimant. Sent him to Rendering Dock. A post-mortem examination was made. Post-mortem changes had so obliterated evidences of disease as to make the examination useless, except that there was abundant evidences witnessed to show that this animal had died of a putrid blood poison.

Liver, enlarged, softened; weight 16½ lbs. Gall, very thick dark. Bladder, one quart of urine, dark bloody. Kidneys, perfectly disorganized. Rectum, gangrenous. Spleen, an enlarged, engorged, pulpy mass. Abomasum, gangrenous. Fat, greenish yellow. Muscles, darkened, mahogany color.

Found an abandoned cow on 1st avenue, between 2d and 3d streets, in a dying condition. An examination at the Rendering Dock disclosed pleuro-pneumonia.

August 19th. Examined 720 head which arrived this morning at Bull's Head, in which lot were Mr. Pile's drove of 85 head, two of which were afterward taken sick.

Received this day the following telegram from Albany:

(Copy.)

ALBANY, August 18th, 1868.

To Hon. GEO. B. LINCOLN, *President Metropolitan Board of Health:*

SIR: Be pleased to send to Millerton, on the Harlem railroad, Dr. M. Morris, to act as Assistant Commissioner, under and pursuant to appointment, under chapter 740, Laws 1866. There are diseased cattle at Millerton, and Dr. Morris is empowered and directed to carry out the suggestions of the Sanitary Committee of the Metropolitan Board of Health, as published in Saturday N. Y. papers in relation thereto.

(Signed)

M. R. PATRICK,
Chairman of State Commissioners.

August 19th. I immediately, upon receipt of the foregoing order, proceeded to Millerton, Dutchess county, New York, arriving at about 6 o'clock, P. M., on the same day.

On the morning of the 20th instant, having learned that a part of the sick herd had been sent to New York the day previous, numbering 17 head, sent telegram to headquarters to have them seized, but it proved too late, as they had been disposed of and could not be traced.

At Millerton, found a portion of a drove of cattle belonging to A. W. and Nath'l Smith, of 73 Washington avenue, Albany, N. Y. This drove originally numbered 65 head, and left Albany on the 9th August, traveling overland toward New York city. They appeared to be a mixed lot of cattle, Illinois, Indiana and others. On the 12th of August, 20 head of this drove were left at Copake, Columbia county. One of these died on the 17th August, after an illness, apparently, of about 48 hours. The symptoms, as described by eye-witnesses, were the same as those I had observed at Bergen cattle yards and Communipaw, viz.: head low down, ears drooping, arched back, great debility, staggering gait, would not feed; finally, lying down, unable to rise until death supervened. It was deeply buried. On the 13th August, 45 head of this drove arrived at Millerton, Dutchess county, N. Y., 12 miles from Copake. Of these, on the 14th two died, 17th one, and 19th one, making the record of this drove, thus far, as follows, 5 deaths.

14th, two died at Millerton. 17th, two died, one at Millerton and one at Copake. 19th, one died at Millerton.

On the morning of the 19th of August the owner, fearing still greater loss, shipped seventeen head of the infected herd for New York by the New York and Harlem Railroad, leaving twenty-four head at Millerton and nineteen head at Copake. Two of those at Millerton are looking ill, the remainder appear to be well, but all, being a suspected herd, were quarantined, to be retained until all danger had passed. The dead animals had been buried in a lot adjoining the pasture where the cattle were found. These two lots of land were, therefore, set apart as quarantine ground, and the following order issued to Mr. Wm. H. Barton, of Millerton, who was placed in charge:

To Mr. W. H. BARTON:

MILLERTON, Dutchess county, N. Y., August 20, 1868.

SIR: You will please retala under your personal supervision the twenty-four head of cattle belonging to A. W. and Nathaniel Smith, of Albany, in the two lots adjoining and belonging to the estate of Mr. John Campbell, where the cattle now are and have been pasturing. You will retain them for one month from this date, or until further order from the State Commissioners or their assistants. You will not allow any cattle to come within 1,000 feet of the quarantine ground. Provide them with plenty of salt and feed if necessary. If any are taken sick confine them in a separate enclosure from those that are well. All animals of this herd that may die are to be buried at least four feet under the surface of the ground, covered with lime or carbolic acid for disinfection. The lots where the cattle are, or have been, to be disinfected with carbolic acid.

By order of the State Cattle Commissioners.

(Signed)

MOREAU MORRIS,

Assistant Commissioner.

Proceeding to Copake, Dutchess county, the same day the balance of the drove were found, numbering nineteen head, upon the farm of Mr. E. Van Benschoten. None of these presented any evidence of the cattle disease, but, as they were a part of the infected herd, they were placed in quarantine. The same order (in substance) was issued to Mr. E. Van Benschoten as to Mr. Barton at Millerton.

August 21st. Learning that there were sick cattle at Amenia, Dutchess county, proceeded thither and found, upon the dairy farm of Mr. Abiah P. Baylis, that out of a herd of thirty, nine had died during the four previous weeks. This herd consisted of twenty-seven cows, one bull and one pair of oxen; of these seven cows, the bull and one ox had died. Three cows and the remaining ox were found sick with pleuro-pneumonia, and the symptoms, as described by Mr. Baylis and the attendants, led me to conclude that those that had died were all victims of the same disease. During the illness of these cows the milk from them had been regularly sent to New York city for consumption. Orders were immediately given, under the authority of the Board of Health, as its Inspector, that no more milk from the infected herd should be sent to New York city. The remainder of the herd were placed in quarantine upon Mr. Baylis' farm, under the supervision of Dr. Desautt Guernsey, of Amenia, for observation and report, and a copy of the same quarantine order left with him as was given to Mr. Barton. Five more of this dairy herd were subsequently taken sick, making nine head which were put under treatment. All these finally recovered.*

August 21st. Returning to New York city, I immediately instituted a thorough inspection of all cattle in the yards of the National Drove Yards at 100th street and 3d avenue, and continued such inspection daily as they arrived from any source.

August 24th. Two sick cattle were found at Bull's Head, in a drove belonging to Mr. S. D. Pile. These left Arrow Rock, Selene county, Missouri, on the 3d day of August, 1868, numbering 83 head, crossed the Mississippi river at St. Louis; here the two sick ones were said to have been added to the drove, making 85 head in all. From St. Louis they were shipped by railroad to Buffalo, Albany and New York city, and arrived at Bull's Head on the 19th instant. On the 22d these two were observed to be ailing, refusing food, and continued getting worse, but all knowledge of their illness was carefully kept from me until the 24th instant, when they were seized and placed in quarantine hospital under observation. Fifty head of this drove had been sold for slaughter, and I have no doubt, from subsequent information, that there were diseased ones among them. Thirty-three head now remained.

*The treatment of these cases showed a remarkable result, viz., out of a herd of thirty head eighteen were diseased; nine of these died before any treatment was instituted, the other nine all recovered under treatment.

The medical and hygienic treatment was as follows: The sick animals were placed in a small enclosure by themselves. Pure carbolic acid was placed in a large open-mouthed bottle, dissolved in water. This was held to the nostrils, and given by inhalation at short and repeated intervals. The heavy oil of coal tar, containing 70 p. c. of carbolic acid, was liberally sprinkled upon the yard where they were kept, thus presenting the fumes of the carbolic acid constantly. The feeding was low diet, plenty of water, salt and out-door air.

Of these, there were 17 head of Cherokee cattle which did not exhibit any evidence of disease; they were allowed to be sold for slaughter; the balance of the herd, 16 native cattle, were placed in quarantine pasture, near Kingsbridge, on the 25th August, where they were retained for four weeks, when, no further evidence of disease among them appearing, they were released.

August 25th. This day a post-mortem examination of one of the diseased steers from Mr. Pile's herd, was held. Present, Drs. E. Harris, R. C. Stiles and B. Howard, Assistant Inspector, all of the Metropolitan Board of Health. A valuation of \$30 having been fixed upon, he was slaughtered.*

White Steer, killed August 25th, 2 p. m., at 100th street. Been obviously sick 32 hours. Temperature rectum $107\frac{1}{2}^{\circ}$ F.; respiration 36; pulse 76; nostrils, profused mucus discharge streaked with blood; anus appears dry and contracted; feces almost natural; urine bloody; animal balances himself by strongly twisting its head and neck to the left.

Post-mortem observations: Temperature of blood 107° F.; reaction neutral; temperature of liver, 17 minutes after death, 106° , and in the middle of this organ, 19 minutes after death, $107\frac{1}{2}^{\circ}$; appearance of sub-cutaneous surface healthy; peritoneal cavity, its fat intensely yellow, cavity contained a large amount of bloody looking serum; gall bladder distended; bile, sp. gravity 1.025, reaction neutral; liver healthy in color and consistence, weight 18 lbs.; kidneys apparently healthy, weight of one 1 lb. 6 oz., of other 1 lb. 7 oz.; spleen 6 lbs. $2\frac{1}{2}$ oz., dashed with large chemoses upon anterior surface, the entire tissue being much engorged and easily broken down; bladder, especially at the *bas fond*, covered with ecchymotic spots; small intestines congested, presenting a general dark blush; no spots; lymphatic glands, in cellular tissue about liver, colored, intensely yellow in center of anterior, with dark green toward surface.

Temperature record of the second steer belonging to Pile's drove is as follows:

August 24th, $105\frac{1}{2}$ deg. Fahrenheit scale.

"	25th, 106	"	"	"
"	26th, 104	"	"	"
"	27th, 104	"	"	"
"	28th, 103	"	"	" chewing cud.
"	29th, $103\frac{1}{2}$	"	"	" appeared dull, does not chew cud.
"	30th, 103	"	"	" was bled this day, half pint from the cervical vein.
"	31st, 101	"	"	"
Sep'r	1st, 101	"	"	"
"	3d, $100\frac{1}{2}$	"	"	"

August 25th. This day made report to the President and Sanitary Committee of the Board of Health, and to the State Commissioners, through Gov. Fenton, as follows:

NEW YORK, August 25th, 1868.

To His Excellency Gov. R. E. FENTON, and the State Commissioners on Diseased Cattle:

SIR: I have the honor to report that two cattle were found sick with the cattle plague, at the National Drove yards, New York city, on the 24th inst., belonging to a drove of 86 head, which left Arrow Rock, Selco Co., Missouri, on the 3d of August inst., owned by Mr. S. D. Pile, of the aforesaid place.

The two steers now sick, were bought in St. Louis ("to fill a car"), and came through with the drove, by railroad, by way of Buffalo and Albany. They arrived in the National Drove yards 19th inst.

Fifty head were sold immediately upon arrival, leaving 33 head; of these, 17 head were Cherokees; they were selected out and allowed to be sold; 16 head of native cattle were removed from the yard to quarantine pasture, which I selected near Kingsbridge, on the "Dyckman estate."

The yards have been thoroughly disinfected.

* Regarding the history of the two bullocks of Mr. Pile's drove which brought his 16 other native cattle under the suspicion that took them into quarantine, it was ascertained that Mr. Pile had purchased them three weeks previous to my quarantine order concerning the herd. He had purchased these cattle at East St. Louis, for the purpose of filling a car as before mentioned, and they exhibited no sign of sickness until two days before I saw them. As they appeared to him ailing, he endeavored to dispose of them surreptitiously, but fortunately they were discovered during inspection, and at once placed under quarantine restrictions. The presence of these sick cattle had already depreciated the value, and interfered with the sale of the whole herd.

Facts which have since been communicated to the Board of Health warrant the conclusion that these two sick bullocks of Mr. Pile's herd received their infection at or near the yards at East St. Louis, where he purchased them; hence, the period of incubation in them could not have been less than 30 days to the first appearance of obvious symptoms at the National Drove Yards.

August 25th. To-day held a post-mortem examination upon one of the two sick, from Mr. Piles' drove, at which were present Assistant Commissioner Orton, Drs. E. Harris, R. C. Stiles, B. Howard, all of the Board of Health. The evidences of the disease were well marked.

In order to prevent the surreptitious movement of suspected and diseased cattle from the National Drove yards, I have this day quarantined the whole of the yards, and ordered that no cattle be allowed to leave them without a proper inspection and permit, signed by the Assistant Commissioner.

The paramount necessity of protecting the public health, as far as possible, with the advice of the President of the Board of Health and its officers, have induced me to take this decided action with reference to this point.

Hoping it may meet your approval, I remain,

Respectfully, your obed't serv't,

MOREAU MORRIS,

Assistant Commissioner.

The following quarantine order was issued this day upon Messrs Allerton, Dutcher & Moore, of the National Drove yards, New York city :

NEW YORK, August 25th, 1868.

Messrs. DUTCHER, MOORE & Co., *National Drove Yards :*

GENTLEMEN: By virtue of the powers conferred upon me as Assistant Commissioner of the State of New York, in the act passed April 20th, 1866, sec. 740, and amended April 19th, 1867, with reference to infectious diseases of cattle, I hereby designate the whole of your yards and enclosures, located between 97th and 100th streets and 3d and 4th avenues, New York city, as quarantine grounds.

You are hereby enjoined from allowing any cattle to leave said quarantine grounds without special permit, signed by the Assistant Commissioner.

Respectfully,

MOREAU MORRIS,

Assistant Commissioner of the State of New York.

August 26th. Inspected this day 1,486 head of cattle at Bull's Head, and made report to President Lincoln and Sanitary Committee of Metropolitan Board of Health as follows;

NEW YORK, August 26, 1868.

GEO. B. LINCOLN, Esq., *President Metropolitan Board of Health and Committee on Diseased Cattle :*

For your information, with reference to the progress, control and investigation of diseased cattle, I have the honor to present the following statement:

Learning the fact that a large number of cattle were expected to arrive at the National Drove Yards, by way of the Hudson River Railroad, at 2 o'clock this morning, and, fearing that some might escape the proper inspection before being slaughtered, a request was made of your President for a sufficient force from the Metropolitan Police to aid me in securing the inspection. This aid was kindly afforded by that department, and proved of great value, as no cattle, arriving either at Hudson River Railroad depot, or by Harlem Railroad, or any other inlet, have left the drove yards without a careful inspection. Measures had been taken previous to their arrival, under the authority conferred upon the Assistant State Commissioner, so that no cattle could leave the yards without such inspection and permit. Under this arrangement I am happy to be able to say that I believe no diseased cattle have escaped observation.

All that arrived at the drove yards underwent a personal inspection, and were found, apparently, in a sound, healthy condition. These numbered 1,101, and, with 393 which were yet in the yards from last market day, made a total of 1,494 head of cattle inspected this day. These cattle are from Missouri, Illinois, Indiana, Ohio, Kentucky and this State. Some of them from the Cherokee country.

One, which I have reasons for believing had been turned out of a slaughter-house near by, was found on the 3d avenue, near 106th street, very sick. He was placed in the hospital lot attached to quarantine, where he will be retained for observation.

The effect of this decided action, in the thorough inspection of all cattle arriving at this large depot for distribution, will be that more care in the selection of droves, and the exclusion of any suspected of having disease, will be exercised at distant points. It will be very difficult to forward diseased cattle to this market by any of the usual routes from this time forth, as I learn by recent advices that at all the prominent stopping and feeding places competent Commissioners and Inspectors are constantly on duty.

Nevertheless, New York city presents so many exposed points at which cattle may enter and pass to the numerous slaughter-houses scattered throughout the Metropolitan District, where unscrupulous persons are ever ready to seize opportunities, and where it is almost impossible to maintain a thorough system of inspection either of cattle or meats, that I would respectfully and earnestly beg to offer the following suggestion: In order to be able thoroughly and efficiently to

certify that no diseased meat either be slaughtered or offered for sale, the business of slaughtering must be confined to fewer points, and at such places as afford the largest facilities for thorough observation. That no meat be allowed to be sold without proper certificate of inspection.

In pursuing investigations with reference to this important subject, as respects the health of the people of this city and Brooklyn, most startling facts appear, and to my own mind afford a reasonable conclusion as to the variations in the death rates, as furnished by your Registrar from time to time.

Not only diseased beef but other meats, as well as vegetables and fruits, must share the responsibility.

In order to secure the inhabitants of the metropolitan district from the danger of purchasing diseased meats, it is *absolutely necessary not only that animals should be inspected upon the hoof, but that a more careful and thorough examination of internal organs while being dressed for market should take place.** It is a well-known fact that a large proportion of the meat slaughtered and inspected under Levitical law, for the use of our Israelitish population, is condemned as respects its use by them, but sold at equally high prices for use by Gentiles.

Up to the present moment no new cases have been discovered.

Respectfully submitted,

MOREAU MORRIS,

Sanitary Inspector M. B. H.

To-day a red ox was found abandoned on 3d avenue, near 103d street, evidently dropped out of some drove going to Bull's Head, from the landing place on Hudson River railroad at 125th street. He was placed in quarantine hospital.

Temperature 106° F.; very feeble, feverish, with staggering gait; all the white of the eyeballs deeply jaundiced; tongue dry; nostrils dry; horns hot; is uneasy; lies down often.

August 27th. Temperature 105°, the animal evidently sinking; unable to stand; dying, and at 8.30 he was dead; sent to rendering dock; examined within six hours and found to present the well defined lesions belonging to the Texas cattle disease.

Another ox was taken to the rendering dock this day, in a surreptitious manner, with the hope of not being discovered. This ox came from a slaughter-house in Stanton street. An examination revealed the same cause of death as in the former case. This animal was purchased at Bull's Head, on the 20th inst., during my absence from the city, and had been kept in a dark shed, near the slaughter-house in Stanton street, during the interval.

To return to the daily record of duties, I need to present in this place the results of post-mortem examinations which were made upon the four remaining bullocks of Mr. J. T. Alexander's herd, which had become convalescent at Communipaw. One of the five sick bullocks which had generously been set aside by Mr. Fitch (the agent of Mr. Alexander), for the uses of the Metropolitan Board of Health, in studying the disease, was slaughtered on the 17th, and results were observed which have been described in the general report, by Dr. Harris. It remains to present in this place the post-mortem inspection of the remaining four. They had been about 15 days apparently convalescent, and had been three or four days very sick, with all the symptoms of the disease. Efforts were made to obtain temperature observations daily, but such observations were made with great difficulty, owing to their restless and wild state; yet on the 9th, 10th and 11th, the temperature was taken once or more daily, in the rectum of each one, and was found to average about 105° Fahr. The post-mortem dissections of these four bullocks commenced at 2 P. M.

These four bullocks were seen to exhibit the usual symptoms of the Texas disease at the first and second visits which the medical officers made to the yards at Communipaw, viz., on the 8th and 9th of August. The lopped-horn steer, which was slaughtered on the 16th, was, at the former dates, believed to be rapidly approaching a fatal result, but these four others were only then beginning to exhibit symptoms. At the time of their slaughter they had been, altogether, about 15 days sick

* Such inspection is now pursued at the Communipaw abattoir, under the authority of the State of New Jersey, by a competent and careful Inspector, and it will at once tranquillize the public fear of diseased meat from that point, and secure a healthy supply.

or convalescing from sickness. They had been carefully fed, and in their drink each of the bullocks had taken a little more than half a drachm of carbolic acid (Calvert's best chrystalized), in 2,000 parts of water, as before mentioned.

RECORD OF POST-MORTEM EXAMINATIONS.

Steer No. 1. Temperature of blood 103° ; thirty-two oz. of, coagulated firmly in twelve minutes. temperature of liver 102° in centre of right lobe, 15 minutes after death; urine, specific gravity 1.000, clear, slightly alkaline, no albumen; feces thin but natural; lungs healthy; liver healthy, weight $12\frac{1}{2}$ lbs.; gall bladder healthy; abomasum, over a large space, signs of recent great congestion. All this part had a whitish appearance, as if the congested membrane had been recently acted upon by carbolic acid. There were two or three superficial ulcers scattered about, having the same appearance as if almost healed. This whitish appearance was not attributed, by the gentlemen present, to the action of the carbolic acid which the animal had swallowed while under treatment; it was considered, rather, to consist of epithelium scales cast off during the progress of the reparative process, which seemed to be rapidly advancing.

Steer No. 2. Temperature of blood, $103\frac{1}{2}^{\circ}$; temperature of liver 15 minutes after death, $101\frac{1}{2}^{\circ}$; urine, specific gravity 1.022, alkaline, contained a good deal of albumen; kidneys remarkably healthy; heart healthy; liver weighed $15\frac{1}{2}$ lbs.; abomasum suffused with a moderate blush and sprinkled with milky white patches; mucous membrane darkly eroded in small patches, but evidently healing in pyloric extremity; rectum shows signs of recent congestion, but seems now very nearly natural.

Steer No. 3 (a tall lean animal). Temperature of blood at death, $103\frac{1}{2}^{\circ}$; temperature of middle of liver 15 minutes after death, 103.75° ; urine, specific gravity 1.025, neutral, inclined to alkaline; kidneys healthy; liver weighed 13 lbs.; spleen weighed four lbs., being engorged and enlarged; stomach and contents in good condition; rectum gives evidence of recent congestion of great extent, which now is quite limited.

Steer No. 4. Temperature of blood, $103\frac{1}{2}^{\circ}$; coagulated in 15 minutes; temperature of right lobe of liver 15 minutes after death, $103\frac{1}{2}^{\circ}$; urine, specific gravity 1.005, neutral or slightly alkaline; no albumen; liver weighed $11\frac{1}{2}$ lbs.; spleen weighed $3\frac{1}{2}$ lbs., much engorged and slightly softened; abomasum shows evidence of recent disease; the papillæ much enlarged at valvular portion; about three inches from pylorus are seen recent and deep erosions cicatrizing.

August 28th, 29th and 30th. Inspected cattle at Bull's Head as usual. None found sick.

Early in the morning of the 30th, Dr. Harris and Prof. Copeman, a veterinary surgeon, joined me at the National Drove Yards for the purpose of taking specimens of blood from the cervical veins of the remaining sick ox of Mr. Pile's herd. The temperature that morning was 103° Fahr. Four vials, containing two ounces each, were taken. The result of the analyses, as given by Prof. Chandler, can be seen in the general report. This animal seemed to improve temporarily after the loss of this small amount of blood, for his temperature on the subsequent morning was found to be 2° lower.

August 31st. The following notice was issued in the morning papers of New York city:

TO DROVERS AND BUTCHERS. Under the authority conferred by the laws of the State of New York, enacted April 20th, 1863, chapter 840, section 9, I hereby order and direct that all beef cattle and cows landing or arriving within the limits of the city of New York be yarded at the Quarantine Yards, 100th street and 3d avenue, 11th avenue, between 40th and 41st streets, city of New York, there to be properly inspected. All cattle found traversing the streets of this city without a permit, signed by the Assistant Commissioner, will be seized and taken to the Quarantine Yards for inspection, unless so far dispensed as to require other disposition. This order to take effect on and after Wednesday, the 3d day of September, 1868.

(Signed)

MOREAU MORRIS,

Assistant Commissioner.

The following supplemental order was issued on the 3d September, 1868:

NOTICE TO OWNERS OF MILCH COWS. A temporary quarantine yard is hereby established for milch cows at Chamberlain's yards, Nos. 70, 72 Robinson street, where they will be inspected daily, and permits given.

Blank permits were provided, of which the following is a copy:

No.	New York,	186 .
I hereby certify that I have inspected	head of cattle belonging to	and
allow them to leave quarantine yard.		

Assistant Commissioner.

These were furnished whenever cattle left the quarantine enclosures, and proved to have been of the utmost value as time progressed.

Finding that cattle were surreptitiously taken to slaughter-houses without the proper inspection upon the hoof, on the 31st August, 1868, the following communication was addressed to the President of the Metropolitan Board of Police, through the President of the Metropolitan Board of Health:

Hon. THOS. C. ACROX, *President Metropolitan Board of Police*:

SIR: Deeming it essential to secure the support and co-operation of your police force, in order to enforce the provisions of the order, herewith inclosed (notice to drovers and butchers), which I find necessary to issue, to secure a proper inspection of all cattle entering this city, that the spread of infectious diseases among cattle, and the sale of diseased meat for food, may, as far as possible, be prevented, I would respectfully solicit of your honorable Board, that an order be issued to its officers, that all cattle found traversing the streets of New York city, without a permit, signed by the Assistant Commissioner, be seized and brought to the quarantine yards for proper inspection.

Having found by actual experience during the past week, that it is impossible to secure a proper inspection of cattle arriving at the markets under present circumstances, and from the well ascertained fact that many diseased animals are taken to slaughter-houses without proper inspection, I am compelled, by the great responsibility which is imposed upon me under the law of the State commission, and by the requirements of the Board of Health, as its officer, to take such measures as will secure, as far as possible, a proper guarantee that no infectious disease shall spread among cattle, and that diseased animals shall not be slaughtered for food in this city.

Your co-operation to this end is, therefore, earnestly and respectfully solicited.

An early reply is desired, that prompt and decisive measures may be taken.

Very respectfully, your obd't serv't,

MOREAU MORRIS,

Assistant Commissioner for N. Y. State.

The Metropolitan Board of Health, on the 2d September, 1868, at a regular meeting, adopted the following:

"Whereas, Assistant Commissioner, Dr. Moreau Morris, has found it necessary to establish two quarantine yards in the city of New York, for the purpose of securing the needed sanitary inspection of all cattle arriving within the city limits;

"Resolved, That the Metropolitan Board of Health hereby expresses its unanimous approbation of this official action of Assistant Commissioner Morris, and requests the Metropolitan Police Commissioners to enforce strict obedience to the orders and regulations which Dr. Morris has established, concerning such quarantine inspection."

September 1st. At Bull's Head inspected 511 head of cattle. In one drove of 27 head, belonging to Mr. Wm. Thompson, from Illinois, there was a sick ox; he was removed to hospital and kept under observation for several days, until he recovered and was discharged.

September 3d. Commissioners General M. R. Patrick and J. Stanton Gould, and Assistant Commissioner Dr. Manlius Smith, their secretary, met Dr. Harris and myself, for conference, and on the 4th visited Communipaw (New Jersey), and the New York Rendering Company's dock, and terminated the day at National Drove yards, 100th street, where we slaughtered and dissected the remaining ox of Piles' herd. Present at the post-mortem examination, Drs. Harris, Stiles, Chandler, Howard, and Mr. Koehler, the artist, besides the Commissioners and Assistant Commissioner before mentioned.

This animal had seemed to be but lightly attacked — the bloody urine, staggering gait, and increased temperature, being the main evidences of disease during life, while the chief evidence of disease, as discovered at post-mortem examination in this case, consisted in the deep discoloration of the muscles and the fat; the presence of extensive erosion and sloughing in the pyloric portion of the fourth stomach and in the usual conditions which have attended this disease in the lesions of the liver and spleen, and most of all, in the microscopical evidence which had been obtained on the 30th of August, from blood drawn from the cervical vein and examined by Dr. Stiles; also the blood taken at the time of slaughter.

September 9th. There arrived at Bull's Head a car load of 19 head of cattle, from Illinois, bought by Baker, at Albany, and shipped to care of Bright & Fagan. The

whole lot not appearing well, were placed in quarantine hospital. The temperatures of all were taken.

At 3:30 found an ox from this car load unable to rise, presenting the prominent symptoms of the cattle fever. Head drooping near the ground, eyes staring, dull; horns cold; body hot; breathing rapid; pulse very feeble, unable to count it; coat rough, covered with flies; temperature of rectum 106½° F. Killed at 6:30 P. M. same day at rendering dock.

Temperature 105½°. Temperature of blood at slaughter, 103°. Temperature of liver 15 minutes after death, 106°.

Bladder contained three ounces of "black water," much distended; mucous surface of neck of bladder oedematous, inflamed. Rectum contained small quantity of hard-rolled dung. The mucous membrane engorged with black blood, rugæ striated with blood. Abomasum, whole inner surface a dark purplish color; pyloric extremity deeply eroded over about one-twentieth part of its surface; the erosions also found on the larger folds. The upper part of the intestine in a like condition. Kidneys enlarged, color very dark, engorged with dark blood throughout. Gall bladder distended with thick, dark, rosey bile. Liver weighed 23½ lbs., without fat or gall bladder; fatty, engorged with blood. Heart large, flabby; blood extravasated between muscular and mucous surfaces. Fat a dark greenish yellow color without consistence. Muscular tissues very dark mahogany color, soft and flabby.

On this date (September 9th) temperature observations were commenced upon this herd of Bright & Fagan's. (Mr. Baker, of Albany, is said to be the owner and shipper.)

Temperature Record of 19 head of cattle shipped to care Bright & Fagan, 5th September, 1868, by Baker of Albany, from Buffalo, arrived at Bull's Head, N. Y., September 9th.

Number.	Sept. 10.	Sept. 11.	Sept. 12.	Sept. 14.	Remarks.
1,.....	102°	102°	101°	101½°	This lot of 19 head, losing one, were discharged from hospital on the 18th September, well.
2,.....	102½°	102°	102°	101½°	
3,.....	102½°	101°	101°	101°	
4,.....	101½°	102½°	101°	101°	
5,.....	102°	102½°	101°	101°	
6,.....	102½°	102°	100°	101°	
7,.....	102½°	103°	102°	101½°	
8,.....	102½°	102½°	102½°	101½°	
9,.....	103°	104°	101°	101½°	
10,.....	103°	103½°	101°	101°	
11,.....	101½°	102½°	101°	101°	
12,.....	102½°	102°	101½°	101½°	
13,.....	102½°	102°	101°	101°	
14,.....	102½°	102½°	101°	100½°	
15,.....	104°	102½°	101½°	101°	
16,.....	102½°	102°	101½°	101°	
17,.....	102½°	102°	101½°	101°	
18,.....	.....	.....	104°	101½°
19,.....	107½°	Slaughter	.....	.....

September 11th. Mr. Dayton, the Inspector, and myself found at 100th street a bullock, of the Bright & Fagan herd, with symptoms of the disease, bloody urine, etc. He was slaughtered at 4 P. M.

Record of Post-mortem. Temperature of rectum before slaughter, 107° F. (Temperature at 9 A. M., 107½°.) Temperature of blood flowing from aorta, 107. Temperature of liver nine minutes after death, immediately upon opening the abdominal cavity and plunging the thermometer in the centre of the liver, 108°. Weight of liver, 18½ lbs.; color of this organ a mottled and ochrey coffee *au lait*. Specific gravity of blood, 1.021. Gall bladder excessively distended, and containing three lbs., ten oz. of thick, flakey bile; specific gravity of this fluid, 1.018. The spleen weighed five lbs., two ounces, and was ecchymotic in appearance, and almost different in its substance. The kidneys weighed one lb. eight oz. each.

September 12th. Early in the morning police officers of the 1st precinct telegraphed to Dr. Harris' residence, and to the office of the Board of Health, that 12 cattle had died during the night at Pier 12, East river.

Taking Capt. Lord, of the sanitary squad, Dr. Harris proceeded to that pier, and to the steamer "Fah Kee," which lay on the north side of that pier and at its outer

end, and they there ascertained that 14 bullocks had died, on board or upon the dock after being taken off the ship, during the night and morning. There were 26 remaining alive; those were being disembarked. It was immediately ascertained that this herd of 40 fat bullocks had been purchased and driven down from 100th street during the previous day (September 11), and that they had been carefully put on board the "Fah Kee" before dark; that the portion of the ship in which they were placed was the main deck, forward of the engine; that they had been purchased by a Mr. Harvey, the contractor who supplies the Bermuda market, for use of the troops, etc., but that they had undoubtedly come from one or two droves recently arrived from some point west of Toledo, *via* Buffalo.

The 26 surviving bullocks were ordered to be carefully driven to the Battery, to remain until sunset, as the day was excessively hot.

I inspected these cattle at the Battery, and ordered them to be removed to Bull's Head during the cool hours of Saturday night and Sunday morning, and took steps immediately to discover whatever could be ascertained concerning the origin of the herd; found that they came from Illinois in a drove of 108 head, brought by "Farlow," and the whole lot were bought by Joseph Williams and William Thompson in Albany.

Before night of the 12th 14 head were dead, and during the following two days three more died, making 17 in all dead out of the lot of 40 head. The remaining 23 head were placed in hospital at Bull's Head until the 17th, when they were removed to quarantine pasture, near King's Bridge, where they remained until 8th October (three weeks), when they were released, being entirely convalescent and appearing to be well. On the 12th October following they were sent to Bermuda and arrived in good condition.

Post-mortem examination revealed the cause of death unmistakably as being of the Texas cattle disease.

The following is a concise abstract of notes made in ten of the *post-mortem* examinations which were held September 12th, 13th and 14th upon the "Fah Kee" cattle:

No. 1. Dissected at 5 p. m., six hours after death. Died at 11 a. m., soon after being taken out of the vessel. The temperature at 10½ a. m., as examined in the presence of Dr. Harris half an hour before death at Pier 14, was 110° Fahr. On *post-mortem* examination the spleen was found normal in appearance; weight one lb. seven ozs. Urine, sp. gravity, 1.019. Weight of liver with gall bladder, 14 lbs.

No. 2. Weight of liver without gall, 14 lbs. The spleen and kidneys were disorganized.

No. 3. The *paunch* and *diverticulum* moderately filled with undigested materials. The omasum and abomasum nearly empty. The manipples of omasum have perfect papulae, but their blood vessels are deeply infected throughout with extravasation of disorganized blood vessels beneath the mucous membrane in several of these manipples. The abomasum shows throughout the whole pyloric portion cicatrized ulcerations, but the membranes are so much altered since death that the full extent of these changes are not easily described.

No. 4 exhibits more extensive erosions and recent cicatrices than No. 3. The abomasum was distended with black blood and some of the ordinary contents.

No. 5 resembles No. 4 in every particular, recent cicatrices covering the tubular portion of the abomasum from the pylorus back to the folds.

The kidneys of the whole three were in a state of diffuent decomposition. Two patches of the folding or omasal portion of the abomasum appear to have been gangrenous before death—deep ecchymosed if not gangrenous.

No. 6 was like No. 3 in every respect.

No. 7 is the red bullock seen alive by Dr. Harris at the vessel, and whose temperature at rectum was 108° in the moribund state at 10½ a. m. yesterday. *Post-mortem* at 11 a. m., 25 hours after death. Stomach in a fair state of preservation. The abomasum contained a small amount of ordinary material and about a pint of thick, tarry blood. There were recent and partial cicatrizations and extensive erosions throughout the tubular portions of this stomach. The liver and kidneys were of a chocolate color, containing a little blood.

No. 8 is the bullock Dr. Harris saw rescued from the water (into which it fell while being lifted off from the deck of the "Fah Kee"). This bullock was slaughtered at rendering dock when in the moribund state. The temperature (immediately upon opening the abdomen) in the fat of the kidney was 103°, and in that of the liver 103½°. The stomach was moderately filled. The omasum showed no extravasated blood, but the epithelium peeled off readily at every point. The abo-

masum contained but a small amount of its ordinary material, and this was mixed with extravasated blood, or the coloring matter of the blood. The fimbriated or folding portion presented upon several of its margins and folds long patches, erosions and sloughs, and throughout the entire circumference of the upper portion of the pyloric or tubular section old erosions, partially healed or recently cicatrized, studded the surface. Specimens were saved.

September 14th. Slaughter and dissection of two that survived to this date.

No. 9. Steer from vessel (that had fallen out at 14th street at 11 P. M., September 12th) killed at 4:45 P. M. Temperature of rectum just before slaughter, $100\frac{1}{2}^{\circ}$. Temperature of blood at slaughter $101\frac{1}{2}^{\circ}$. Temperature of liver 15 minutes after death, $101\frac{1}{2}^{\circ}$. The rectum, commencing two inches from the anus, on its internal aspect presents two deep ulcers, one extending five inches in the direction of the longitudinal rugæ, another extending about an inch. Weight of liver, $22\frac{1}{2}$ lbs. Spleen engorged and enlarged, weighing three lbs.

No. 10. The steer from Robinson street (fell out when being driven up from the Battery, and was allowed to remain until this hour for slaughter). Liver $23\frac{1}{2}$ lbs. The abomasum contained patches of the characteristic erosions, some recent and some nearly healed. The tubular rugæ of rectum engorged throughout their whole extent.

September 15th. During the inspection at Bull's Head this day a sick steer was discovered in the drove belonging to Mr. P. F. Carey. Temperature of rectum, 107° Fahrenheit. A valuation of \$80, contingent upon conditions to be discovered, having been made, he was ordered to be slaughtered. The temperature record of this steer this day was as follows:

Eight o'clock A. M., 104° Fahrenheit, and at 1 P. M., 105° ; and at 1:30 o'clock P. M. he was slaughtered in presence of several Inspectors of the Board of Health, who had been detailed this day to make investigations in the slaughter-houses with references to diseased animals and meats. Temperature of blood flowing from carotids, $106\frac{1}{2}^{\circ}$ F.; of liver 15 minutes after death, $105\frac{1}{2}^{\circ}$ F.

Post-mortem appearances. Omental fat brownish yellow; other fat lighter yellow. Muscular tissue dark red. Liver weighed $16\frac{1}{2}$ lbs., and presented excessive fatty degeneration, engorged with blood softened. Gall bladder distended with thick, dark, flakey bile. Urine normal. Abomasum, upon mucous surfaces dark, irregular shaped, elongated erosions, some in process of cicatrization; and upon the pyloric portion several large cicatrices were seen where the eroded surface had healed. Spleen, enlarged weight $2\frac{1}{2}$ lbs., congested. Kidneys engorged with blood; color dark; weight of both five lbs. Rectum presented a few points of inflamed rugæ. Omasum, papillæ contracted, surface dry, filled with hard cakes of food.

September 17th, 18th, 19th and 20th. Inspected cattle at Bull's Head, and also made examinations at slaughter-houses, with reference to diseased animals, with the detail of Inspectors of the Metropolitan Board of Health. The results of those inspections were reported to the Board of Health on the 22d day of September, in detail.*

September 24th. A dead steer sent to rendering dock from Bull's Head that was found dead in the yards, having arrived from Albany on the day previous. He was examined on the 25th at the dock.

September 26th. Quarantined 69 head of Texas cattle at Bull's Head, owned by Henry Livingston, looking badly; some suspicion of disease among them. They were released on the 28th, finding none sick.

This day removed to hospital three steers, one white, owned by Westheimer & Myers; released on the 28th.

Same day two more, red and white, belonging to Mr. D. Adler; white released on the 28th.

Slaughtered a red steer at Bull's Head, owned by Mr. V. Samuels, valued at \$40. Also slaughtered another steer at same place, owned by David Adler.

The first steer had been sick in hospital for several days, and his temperature taken as follows (he had a persistent cough, dullness on percussion over the lungs, with submucous rate):

Temperature observations 23d, morning, 105° ; evening, 104° . 24th, morning, $103\frac{1}{2}^{\circ}$; noon, 104° ; evening, $104\frac{1}{2}^{\circ}$. 25th, morning, $102\frac{1}{2}^{\circ}$; noon, $104\frac{1}{2}^{\circ}$; evening, 103° ; 26th, $103\frac{1}{2}^{\circ}$; noon, slaughtered.

Temperature of blood at slaughter, 105° F. Lungs adherent to plenra; pneumonia in both lungs. Plenro-pneumonia, old phthisis, and also the peculiar lesions of convalescents from Texas disease, in liver, spleen, abomasum and rectum.

* An abstract of the report here referred to is published in the report of the Metropolitan Board of Health for 1868. See appendix.

The second case examined was slaughtered in the dying state, and presented a typical condition in all the internal organs. Prof. Law, of Cornell University, Dr. Harris, Registrar of Metropolitan Board of Health, Dr. E. H. Janes, Sanitary Inspector Metropolitan Board of Health, the artist, Mr. Kohler, and many others were present.

Bullock No. 1. Killed at Bull's Head September 26th, at 2:10 P. M. Temperature of liver 18 minutes after death, $103\frac{1}{2}^{\circ}$; weight $23\frac{1}{2}$ lbs. Spleen very large, weighing eight lbs. 14 oz., and its length two feet six and one-half inches, and eight inches wide. The duodenum inflamed and cedematous through its whole extent; and its mucous membrane soft, so soft that it was scraped off by lightly passing the nail over it. The ductus communis choledicus on opening was found to be inflamed throughout, and having longitudinal bloody streaks like fresh ecchymoses of blood; at one point was found what seemed to be a little ulcer, recently sloughed. One kidney weighed two lbs. 13 oz., the other two lbs. 14 oz. These viscera were sketched on the spot by Mr. Kohler. The blood and bile were subjected to chemical analysis.

No. 2. Temperature of blood of aorta at death, $106\frac{1}{2}^{\circ}$. Temperature of liver 15 minutes after death, 106° ; the liver was but little above the normal size. The spleen weighed $2\frac{1}{2}$ lbs. The bile presented only slight characteristics of the disease. The conclusion was that this bullock was convalescent when attacked with pleuro-pneumonia. The disease in the chest was very extensive, and would necessarily have proved fatal in the course of a few days, owing to the great effusion in the pleuritic cavity.

September 27th. Visited Communipaw with Professor E. Law, Drs. E. Harris, E. H. Janes and others, and witnessed the slaughter of several Texan cattle.

Dissections of ordinary Texas cattle at Communipaw, September 27th, that presented an unhealthy appearance while living.

Bullock No. 1. Estimated gross weight of bullock 1,500 lbs. Temperature of blood at slaughter, 100° . Abomasum, folds normal in appearance, presenting a few slight recent abrasions in the lower section of the folds and a few old cicatrices. The pyloric portion, like the folds, normal in color, soft, marked extensively over the whole tubular section with cicatrices and old sloughs, most of them extending longitudinally upon the rugae. The length of the cicatrices varies from one and one-half inches to a quarter of an inch, a few not yet covered with epithelium. The spleen normal. The rectum perfectly healthy.

No. 2. Spleen large, but natural in appearance.

No. 3. Spleen rather large, though healthy in appearance. The abomasum, color of mucous membrane normal.

No. 4. Spleen rather large and darker than natural. Extensive old cicatrices of the abomasum, about one-sixth of the whole tubular portion marked with these cicatrices.

No. 5. The abomasum, the color of the mucous membrane over the folds rather darker than natural; mucous membrane soft, but untouched by any disease, so far as its present appearances are concerned. The tubular portion covered over about one-fifth part of its surface with cicatrices, only a few of these have yet received an investment of epithelium.

No. 6. The abomasum very similar to that of the others, with congestion of the folds, presenting cicatrices and a few sloughs near the pylorus, one of which had extended down to the muscular structure, much contracted in circumference, healing not yet completed.

No. 7. Shows no evidence of having suffered from the disease. The abomasum showing venous engorgement. Spleen smaller than in actual disease.

No. 8. Abomasum shows the common erosions with black surface. The pyloric portion exhibits the erosions, but somewhat more convalescent than the others.

No. 9. Temperature of blood at slaughter, 102° .

No. 10. Temperature of blood at slaughter, 99° . The ductus communis choledochus was examined and found thickened. The abomasum contained some extensive erosions, some in the pylorus. The spleen was contracted in shape and very dark colored.

No. 11. Abomasum exhibits highly congested venous engorgement, with extensive old erosions, extensive cicatrices of the pyloric portion.

These eleven post-mortems were made for the purpose of witnessing the condition of the viscera, etc., in a herd that had arrived by way of Abilene, Kansas, and which had been pastured for two months in Illinois, without any discoverable sign of infection of disease, except that a few of the steers had a sickly and emaciated appearance.

September 28th. Inspected cattle at Bull's Head; released 69 head of Texans belonging to Henry Livingston, in quarantine for two days.

October 6th. In examining cattle at Bull's Head, found a white ox in yard belonging to S. B. Richardson. He came from near Lafayette, Indiana, in a drove

of 174 head bought of Clafner, at Buffalo; 57 head came to New York, and 117 went to Bergen, N. J. When found, this ox lay groaning in distress; rectum protruding, very red; making constant and painful efforts to defecate, without being able to pass anything; restless, lying down and rising frequently; going to the trough for water every few minutes. Removed to hospital. Temperature, $104\frac{1}{2}^{\circ}$. He was kept under observation. Recorded the following temperature, Fahrenheit scale:

October 6th, $104\frac{1}{2}^{\circ}$; October 7th, $104\frac{1}{2}^{\circ}$; October 8th, $104\frac{1}{2}^{\circ}$; October 9th, $104\frac{1}{2}^{\circ}$; October 10th, $103\frac{1}{2}^{\circ}$; October 11th, 103° .

The owner supposing him to be suffering from constipation (he did not chew any cud during the six days), was allowed to treat him as he desired. Injection, per rectum, of various kinds was resorted to, but without relief. On the 11th October, showing evident signs of collapse, he was valued at \$40, and slaughtered in presence of Drs. S. Smith, E. Harris, E. H. Janes, F. J. Randall and myself, together with Mr. Kohler, the artist, and many others.

The notes upon this case, taken at the time of slaughter, are as follows:

Respiration, 26 per minute. Temperature of rectum, $103\frac{1}{2}^{\circ}$. Slaughtered at eight minutes past 11 A. M. Temperature of blood flowing from aorta, 101° . Temperature of rectum, $100\frac{1}{2}^{\circ}$. Temperature of liver, 100° . Specific gravity of blood, 1.055.

For 15 minutes after death the blood from the aorta remained fluid; began to coagulate 20 minutes after flowing from the aorta. Spleen, 2 lbs. $11\frac{1}{2}$ oz. Liver, 18 lbs. 4 oz., divested of the bile and gall bladder. It appeared fatty throughout (subsequent examination proved, that, like the liver of the bullock that was slaughtered on the 26th of September, the morbid alteration consisted as much in a "waxy" degeneration as in the fatty deposit). Minute biliary vessels visible everywhere, the color resembling "*café au lait*" of an ochre hue.

This is one of the few chronically diseased cattle, that, after ineffectual attempts at convalescence, became deeply jaundiced and anæmic. The spleen, the liver, the blood, the bile, and the fatty and cellular tissues bear unmistakable marks of the disease. Dr. Harris had the artist sketch the morbid appearances. (See plate 23 in general report.)

This was a typical case of the "Texas disease," and revealed a large mass of cellular tissue around the rectum, and in which the kidneys were imbedded, which, upon microscopic examination, revealed an abundance of hæmatoidine crystals.

October 17th. Three steers found sick—two of Bright & Fagan's and one of Williams & Richardson's. Removed to hospital.

Temperature Records as follows:

DATE.	LOP-HORN—B. & F.			SPOTTED—B. & F.			CRUMPLE HORN—W. & R.		
	A. M.	M.	P. M.	A. M.	M.	P. M.	A. M.	M.	P. M.
October 17,	$100\frac{1}{2}^{\circ}$	101°	100°	$101\frac{1}{2}^{\circ}$	101°	102°	$104\frac{1}{2}^{\circ}$	$103\frac{1}{2}^{\circ}$	102°
18,	$100\frac{3}{4}^{\circ}$	101°	100°	101°	$101\frac{1}{2}^{\circ}$	101°	$104\frac{1}{2}^{\circ}$	$103\frac{1}{2}^{\circ}$	102°
19,	100°	$100\frac{1}{2}^{\circ}$	$100\frac{1}{2}^{\circ}$	101°	$101\frac{1}{2}^{\circ}$	102°	104°	$103\frac{1}{2}^{\circ}$	$103\frac{1}{2}^{\circ}$
20,	100°	Released	.....	100°	$101\frac{1}{2}^{\circ}$	.....	103°	$100\frac{1}{2}^{\circ}$	Released
21, .....	.....	.....	.....	100°	101°	99°
22, .....	.....	.....	.....	100°	101°	100°
23, .....	.....	.....	.....	100°	$99\frac{1}{2}^{\circ}$	98°
24, .....	.....	.....	.....	99°	100°	Released	.....	.....	.....

On the morning of October 17th a fine, fat bullock was abandoned near the National Drive Yards, and was carried to the rendering dock and slaughtered during the afternoon. The animal was slaughtered when in a moribund condition. Temperature of rectum, blood and of the liver was $101\frac{1}{2}^{\circ}$. Weight of liver, 24 lbs. Gall bladder filled with thick, flaky bile. Weight of spleen, $5\frac{1}{2}$ lbs.; disorganized. Bladder filled with bloody urine. Rectum contained a thick, black fluid resembling black vomit. The fourth stomach was eroded and ulcerated. The kidneys were engorged to 75% more than their natural size, and were beginning to be disorganized. Lungs were healthy. No coagulated blood was found in the heart or great vessels.

From October 17th to 22d daily inspections of all cattle arriving were continued. No new cases found. 22d. Commissioner Gould, having learned some facts with reference to a dairy herd that had become infected at Hamptonburgh, desired me to go with him and prosecute an investigation into the circumstances.* We, therefore, proceeded to Newburgh, and were joined by Dr. R. V. K. Montfort, the Assistant Commissioner for Orange county. We then visited Goshen, and from thence went to Hamptonburgh, where the following facts were elicited:

On the 25th day of August there arrived at Hamptonburgh 44 head of native cows and heifers directly from Painesville, Lake county, Ohio, on the line of the Shore road, over which Texas cattle frequently travel. They were purchased in Buffalo for a Mr. Hodge, a cattle dealer at Goshen, Orange county, N. Y. On the morning of arrival one of the cows was observed to be unwell, and died in a few hours. The symptoms observed were as follows: The head hanging low down, gait staggering; appeared very weak and finally fell down, death supervening soon afterward. August 29th (four days after) two cows were purchased of the same lot by William Moul, apparently well. They were driven about six miles, and were turned into the pasture among the dairy cows of Mr. John Moul. Here they remained from Saturday, the evening of the 29th, until Tuesday morning, the 1st of September (three nights and two days), when they were removed some miles distant. September 8th one of these cows died. The other was then taken back to Hamptonburgh, the place of purchase, as under suspicion, and on the 10th of September also died. The symptoms of disease of this cow were recognized as the same as those that had been seen among cattle at Buffalo that had died with the "Texas fever," and were as follows: Drooping of head and ears, staggering gait, eyes dull and staring, great debility, rough coat, and generally such appearances as are not observed in the ordinary diseases of cattle, with which they had been familiar for years. Upon tracing what had happened from the exposure of the dairy cows upon John Moul's farm, where these two cows had been pastured for a short time, we found that upon the 12th of September (thirteen days after exposure) one of the milch cows was found to be ailing. Her milk had been falling off in quantity for three or four days. She appeared uneasy, frequently lying down; very thirsty; would not feed; head drooping near the ground, standing braced with the hind legs; coat rough; dung natural; urine not noticed; no cough; and on the night of the 13th died. On the 14th (fifteen days after exposure) another

*Dr. Montfort, the health officer of Newburgh, who had been vigilantly watching the movement of suspected cattle arriving at that city from Albany, unexpectedly discovered that the Texas cattle disease had made its appearance on the south-western margin of that country, near Hamptonburgh. The following is his first account of that outbreak:

NEWBURGH, September 17th, 1868.

E. HARRIS, M. D., *Metropolitan Board of Health*:

DEAR DOCTOR: Two car loads of cattle (40 in number), said to be from Ohio, were purchased at Montgomery, in this county, on the 28th day of August, and were driven some five or six miles to Hamptonburgh the same morning, arriving about 9 or 10 o'clock. Soon after one of the finest cows in the herd was taken sick and died before night. Two of the herd were bought by William Moul, a neighboring farmer, and were left three or four days upon the farm of John Moul, grazing with his dairy cows. They were then removed. Ten days after their purchase one of these cows sickened and died in a few hours. Three days later the second cow also sickened and died in a few hours. Saturday, September 12th, one of the cows of John Moul was taken sick. She died on Sunday. Monday night another cow of John Moul sickened and died Tuesday afternoon. Both of these had grazed with the two left for a few days by William Moul. The remainder of John Moul's cattle are still healthy. Fifteen bullocks out of two car loads are yet in the neighborhood; all well. Two were purchased by a Mr. Carroll; one is well, the other sick; appears very weak, pants heavily on the least exertion, gives milk but in small quantities, feeds poorly, had a calf two weeks ago. The owner says she never *cleared*, and ascribes her illness to that cause. Eleven of the same load were sold to a farmer near Montgomery, and when last heard from were all well. I know nothing of the balance (9). Hamptonburgh is an old cattle stand where a large part of the farmers of that portion of Orange county purchase their stock.

Yours truly,

R. V. K. MONTFORT.

(Signed)

[Senate No. 9.]

cow was observed to be sick, presenting symptoms the same as the former, with the addition that she seemed indifferent to passing objects, remaining alone by herself, and passed bloody discharges from the bowels, and dark bloody urine; milk suppressed, although she gave the usual quantity the night before. She had been suffering with hoof distemper three weeks previously, but had entirely recovered from it. She died on the 15th (the following day). The 18th of September (nineteen days after exposure) the third cow was sick, and during that day was found dead in the pasture. Her milk had been diminishing in quantity three or four days previous to death, and she had presented much the same symptoms as those previously affected. These cows unfortunately were not examined after death, but were deeply buried. The two cows that had died of the original herd were not buried sufficiently deep, as during the process of decomposition after death the thin covering of earth was thrown off, leaving the carcass of one of them exposed. Two pair of oxen and two young heifers were allowed to pasture in this field where the dead cows were buried, and one of the pairs of oxen was used in hauling the dead cow. About two weeks after one of the oxen was found to be sick, and presented the same symptoms before described, from which, however, he finally recovered. Another ox belonging to the second pair was found dead on the 21st of September in the field, being twenty-eight days from the burial of the first cow.

October 24th. The two heifers, one a yearling, the other two years old, which had been pasturing in the same field where lay the dead cows, and where the oxen were sick also, were found dead. They had not been discovered to be suffering with any illness. A post-mortem examination of these revealed the livers enlarged; spleens enlarged more than twice their natural size, engorged with blood, in a state of decomposition; kidneys engorged with blood, softened almost to decomposition; bladders containing a very small quantity of urine of a healthy consistence. All the other organs were found in a healthy condition, except the abomasums, or fourth stomachs, which presented several superficial ulcers upon the thick or pyloric extremity, as well as some lines of ulceration among the folds of the thinner portion. The carcasses after examination were thoroughly burned up.

From these investigations, which were carefully and thoroughly made by the State Commissioner, J. Stanton Gould, and Assistant State Commissioners, Drs. R. V. K. Montfort and Moreau Morris, there can be no doubt that the drove originally from Painsville, Ohio, had been infected with the malignant poison either before starting or during their journey, and that they had communicated the disease to the dairy cows and oxen at Hamptonburg. These dairy cows had not been off from the farm of Mr. John Moul for the past two years, and had not been exposed to any strange cattle at any other time. The oxen had been in the town and county for several years, and had not been exposed in any other manner. That these cattle had the "Texas fever," all the testimony of persons who had observed them, and by one who was familiar with the symptoms, having frequently seen cattle suffering with the disease at Buffalo, must convince any candid mind. The remarks of several persons (old dealers in cattle) that these sick ones did not appear to have any disease with which they had been familiar, afforded another proof that this was an importation of some new and malignant disease among them. Two more milch cows died, one on the 26th and the other on the 28th October. The subjoined letter from Dr. Montfort gives the history of these cases:

NEWBURGH, November 9th, 1868.

MOREAU MORRIS, M. D.:

DEAR DR.: We have had no new cases of Texas fever since I saw you. The first case after you were here occurred on Monday, the 26th of October. She was observed to be sick on Monday, with the usual premonitory symptoms, although they were so slight as readily to escape the observation of a casual observer. She gave a fair quantity of milk at night. She died about 7½ A. M. Tuesday. A post-mortem made about eight hours after death gave the following results: Flesh very dark; fat of reddish-yellow color; lungs perfectly healthy; heart healthy; spleen enlarged to three times its natural size, engorged with blood and disorganized; liver slightly enlarged and fatty; gall bladder very full, contents but little changed; kidneys natural; fourth

stomach reddened and inflamed, particularly at pyloric extremity, with ulcers, mucous coat softened, peeling off readily; bladder entirely empty and contracted, feeling almost like a ball; rectum very much inflamed, mucous membrane softened. The period of incubation could not have been less than thirty-five days. Another cow died on Wednesday night, October 28th. She was first seen to be sick in the morning. Nothing particular was observed excepting the arching of the back and great restlessness. No post-mortem.

Yours, truly,

R. V. K. MONTFORT.

(Signed)

REMARKS UPON THE CASES IN ORANGE COUNTY.

This remarkable group of cases in Orange county justly awakened a profound interest, and induced the most searching inquiries connected with the history and exposure of the herd in which these deaths occurred. The exceptional characteristics presented by the sickness in those herds called for the most exact diagnosis of the nature of the disease. First, cattle that were supposed to be natives of the Western States, and that had arrived from Painsville, Ohio, in the ordinary course of traffic and transportation, began to show symptoms of disease within a week from the time of their shipment from Painsville, Ohio. The true Texas cattle disease, as has been shown in Dr. Harris' correspondence, was at the time prevailing in Summit county, Ohio. That these cattle, which were at least reputed to be native stock, and communicated the disease to the healthy herds of the district with which they were pastured in common, did communicate the same kind of fatal disease that killed several of their own number, does not admit of the shadow of a doubt. In the absence of those exact methods of investigation which the medical anatomists pursued in our cities, we do not hesitate to take the straightforward testimony of experienced herd-men who saw the disease and described it to us.

In the two post-mortem examinations which Health Officer Dr. Montfort and I made at Hamptonburgh in the month of October, we were able to recognize the disease by the usual post-mortem evidences, and better still by the particularity and completeness with which the entire history of events and symptoms of these cattle were related to us. Here was the history of eight fatal cases of the Texas cattle disease in three different herds, in which no ground of doubt existed that exposure to the Western cattle constituted the starting point and source of the disease; and, viewing these eight cases purely upon medical evidence alone, we might safely conclude, reasoning by exclusion, that the Western cattle brought the disease into these herds.

The points we would notice specially in these cases occurring in Orange county, are:

1. The evidence concerning the period of incubation gives an interval from 14 to 28 days;
2. From careless and imperfect burial of dead diseased cows the infection was communicated to other healthy native stock; and,
3. That the evidence of the contagion of the Texas cattle disease being communicated from native to other native cattle in this group is beyond a doubt.

THE INVESTIGATION INTO THE HYGIENIC CONDITION OF BEEF CATTLE OFFERED TO THE METROPOLITAN MARKETS, AS FOUND IN THE SLAUGHTER-HOUSES AT A PARTICULAR TIME.

Numerous facts having come to the knowledge of the Board of Health, concerning diseased meat being offered for sale in the public markets, a simultaneous inspection at a large number of slaughter-houses during the slaughter of cattle, for a limited period, was deemed necessary.

On the 15th day of September, the following order was issued to eleven Sanitary and Assistant Sanitary Inspectors of the Board:

(Copy.)

METROPOLITAN BOARD OF HEALTH,
NEW YORK, September 15th, 1868. }

To Dr. MOREAU MORRIS, *Sanitary Inspector M. B. H.*

SIR: I have called upon the Acting Superintendent of the Metropolitan Board of Health, Dr. Horatio Paine, to call together a force of Inspectors, twelve in number, viz.: Strang, Howard Wadsworth, Demainville, Randall, W. V. White, Lee, Janes, Thayer, Fisk and Colton and Deputy

Registrar Stiles, to meet at this office at 11 o'clock to-morrow, September 16th, for special duty of inspection—subject to your special direction—upon the matter of diseased cattle and diseased meat in our midst. You will proceed with this inspection at once and report.

Yours, very respectfully,

(Signed)

GEO. B. LINCOLN.

President Metropolitan Board of Health.

The following named gentlemen were thus detailed: Inspectors, Drs. Janes and Lee, of New York, Dr. Fisk, Thayer and Colton, of Brooklyn; Assistant Inspectors, Drs. Howard, Strang, White, Wadsworth, Demainville and Randall, of New York; and were directed, under specific instructions and uniform methods, to make examinations at the different butcheries in their respective districts. All proceeded at once to the dock of the New York Rendering company, foot of 38th street and North river, where an animal sick with Texas cattle disease was slaughtered in their presence and carefully dissected. Illustrations of the specific lesions of the disease, which had been made from previous dissections of slaughtered animals, were also exhibited to them, with explanations, so that their examinations could be made understandingly.

The investigation was continued for three days consecutively, with the following results:

Two hundred and ninety cattle were slaughtered in their presence, and of these, 236 presented evidences of diseased conditions. The viscera of many others which had been slaughtered upon the same days, but at whose slaughter they were not present, were also examined carefully and found to present evidences of the same conditions. With two exceptions, all reported finding abundant evidences of different conditions of gastric disease, while but two were able to identify the lesions found as belonging to the Texas cattle disease. (See plate 3.) These were observed by Drs. E. H. Janes and B. Howard in a lot of 94 Texan cattle that had recently arrived from the West, and among those that had introduced the disease among native cattle in Illinois, and had not been wintered one season at the North. Dr. Janes reports "from the foregoing facts, a thorough examination of their internal organs became a subject of more than ordinary interest. The abomasums, without exception, revealed evidences of having been extensively diseased, as shown by numerous cicatrices and erosions in the process of healing, as well as a general hyperæmic condition of the mucous membrane, showing that the animal was suffering to a greater or less extent with chronic gastritis at the time of slaughter. The spleens were invariably enlarged to at least twice the size of those from healthy Northern stock, as was found by testing the weight of each. Photographic views, illustrating the comparative size of the spleens of the Texan with that of the Northern stock, have been prepared. (See plate 4.)

Dr. Howard being present also at the slaughter of a portion of this herd, remarks that "the lesions observed in these Texas cattle were the same as those we had found in those of our native herds affected with this disease, and that as nearly as possible the disease in each case is identically the same."

Having been present myself during the slaughtering of a portion of this herd, I can fully corroborate the truth of the foregoing statement.

As a result of these investigations, the following conclusions are unavoidable:

That our Metropolitan markets are supplied with large quantities of unwholesome beef, the cause of which is wholly preventable.

That cupidity and self-interest among a large class of dealers, will regard neither health or life in the pursuit of gain; consequently it is the imperative duty of legislators and health authorities to authorize such sanitary regulations and restrictions as shall at all times guard and protect the public health.

Skilled inspection and regulation in the transportation of our animal food supply, from the great producing sources to the final slaughter, with proper authority to compel compliance, would be, and is, the only safeguard necessary to secure a healthful animal food. Our State and the Metropolitan district, being the great consumers, must place such restrictions as will secure this end.

OBSERVATIONS UPON POST-MORTEM EXAMINATIONS OF DISEASED TEXAS CATTLE SLAUGHTERED AT BUFFALO, N. Y., LAFAYETTE, IND., AND SPRINGFIELD, ILL., AT WHICH WERE PRESENT COMMISSIONERS PATRICK AND GOULD AND ASSISTANT COMMISSIONERS MACKAY AND MORRIS.

At Buffalo on the 24th November, 1868, we found in the cattle yards of the New York Central railroad two Texan steers, arrived on the 23d instant directly from Abilene, Kansas, owned by George Toffey, sick with the Texas cattle disease, and evidently in its last stages, presenting the following obvious symptoms:

No. 1. A dun colored, four year old steer; standing with his head low down; saliva running from the mouth; ears drooping; eyes staring, glassy and dull; coat rough; arched spine; hind feet drawn under the body; voiding bloody urine; feces fluid and dark; gait staggering; subcutaneous tendinum of portion of flank muscles; great debility; unable to walk any distance without falling down, rising with great difficulty. Temperature of rectum, $105\frac{1}{2}^{\circ}$ Fahr.

Pathological appearances at slaughter, 1 P. M. same day. Temperature of blood flowing from carotids, $106\frac{1}{2}^{\circ}$ Fahr. Liver enlarged; much congested; fatty degeneration; and weight 17 lbs. 8 oz. Spleen enlarged; engorged with dark blood; a pulpy mass; size 2 feet 5 inches long, $6\frac{1}{4}$ inches wide, and at the thickest part $3\frac{1}{2}$ inches through; weight 5 lbs. 13 oz. Omasum or manifold stomach, the maniples impacted with firm, dried, partially digested food, resembling gun wads in form. The epithelial coat peeled off whenever the food was removed, and was easily detached by the finger. Abomasum (fourth or rennet stomach) presented deep excavated ulcers through the muscular coat, particularly in the pyloric portion. The larger folds of this stomach very slightly inflamed, and having small longitudinal ulcerations along the margins of the folds filled with coagulated blood. Bladder distended, with about a quart of dark, bloody colored urine. The mucous coat of its neck very oedematous; that of the fundus thickened and covered with fine red puncta. Kidneys enlarged; much congested with blood; mottled; of a very dark brownish color; softened. Rectum, longitudinal folds highly injected and inflamed—eight in number. Cæcum deeply injected at its extremity. Dæum, large red points arranged in longitudinal lines. Epithelial coat softened and easily removed by the nail. Brain somewhat softened in its cortical substance. Bile thick, tarry, somewhat flaky, though less so than in many cases previously observed.

No. 2 was of a dun brown color; Texan; aged about five years.

External or obvious symptoms. Head hanging down; ears drooping; eyes dull; conjunctiva jaundiced; listless; gait staggering; feeble; flanks very much tucked in; urine clear; feces, thin, dark fluid; pulse 120 per minute, soft and easily compressed; temperature, $104\frac{1}{2}^{\circ}$ Fahr. Slaughtered at 2 P. M. same day. Temperature of blood, $105\frac{1}{2}^{\circ}$. Temperature of liver 15 minutes after death, $104\frac{1}{2}^{\circ}$; fatty; larger size than average normal; not weighed. Spleen enlarged and engorged with dark blood; pulpy mass; weight 3 lbs. 15 oz. Brain, superficial vessels much congested; cortical tissue softened. Bladder, small quantity of urine of healthy appearance. Abomasum, or fourth stomach, presented over its pyloric surface several cicatrices in different stages of reparation, and one large deep excavated ulcer with edges everted—size of ulcer, two inches long, one inch wide and one-half inch deep, surrounded with dense, hardened tissue. Some marks of gastritis, consisting of erosions of the thin mucous coat of the large folds along their free margins. Omasum, or manifold stomach, appeared healthy. The intestines appeared in a healthy normal condition except rectum, which was somewhat congested. Kidneys normal.

Specimens of the blood, bile and tissues of these animals were secured, and a portion of each forwarded to Dr. Stiles, of Brooklyn, for microscopical examination. He reported a few days after that these specimens presented indubitable evidences of the Texas cattle disease. The same evidences were observed by an examination under the microscope of Prof. Hadley, of the Buffalo Medical College, upon the day of slaughter.

At Lafayette, on the 27th November, we examined the stomachs and other viscera of over 20 Texas animals of a herd of 1100 that had not been wintered over, but arrived in Indiana early in the spring. These animals were said to have communicated the disease to various other herds of native stock during the past summer, and 240 of them were now being slaughtered for packing at the establishment of Sample & Sons at Lafayette, Ind. The stomachs, livers and spleens afforded in every instance examined evidences of former disease.

At Springfield, on December 1st, two healthy animals were examined at slaughter—one a Texas steer, the other a native heifer. The Texas steer presented cicatrices of former ulcerations in the pyloric portion of the fourth stomach, although all other internal organs were perfectly healthy; while the fourth stomach and all other viscera of the heifer were in a sound and healthy condition.

EVILS THAT HAVE BEEN RESTRAINED AND CONTROLLED, AND SANITARY MEASURES CONCERNING CATTLE AND BEEF, IN THE CITIES OF NEW YORK AND BROOKLYN.

Observation has revealed the fact, that large quantities of unwholesome beef and other meats are constantly thrown upon the supply markets for consumption, so prepared and disguised that detection is almost impossible. Unscrupulous dealers, having no fear of authority to control them, unhesitatingly sell whatever can be obtained, regardless of life and health. The laboring classes, those who really need the most wholesome and nutritious of meats, are therefore the greatest sufferers, for, by reason of low prices, they are induced to purchase inferior qualities. Hence, the imperative necessity for sanitary regulations and control, that all danger of diseased and unwholesome meat consumption must and shall be avoided.

The results of the control and regulation of meat supply, as carried out during the past few months, are, that a better quality, at reduced prices, were secured; thus protecting the lives and health of all, and establishing the necessity for a continued and systematic inspection, not only at the great sale yards, but also at the butcheries.

The alarm of the public by rumors of diseased meat being offered in the markets, and the fact of being unable to discriminate between wholesome and unhealthy meats, caused the consumption and sale of beef to be very largely diminished. Supplies of market cattle at the herd-yards were seriously threatened, until the prompt and efficient measures adopted by the Board of Health and State Commissioners, in the sanitary control and inspection of all herds arriving at our herd-yards, reassured the public, and at once established confidence both in its sale and consumption. The danger to life and health by its consumption was great, and, on the other hand, the deprivation of good animal food, was not without evil; therefore to secure both, was a paramount duty of the Board. The sanitary regulations established by the control, inspection, seizure and destruction of diseased animals and beef, was therefore at once determined upon and effected. All beef cattle arriving within the Metropolitan district were subjected to a critical inspection as regards their physical condition; if any were found either sick, or under suspicion of being infected with disease, they were at once seized and either slaughtered and sent to the rendering tanks, or held under observation until all danger from diseased conditions had passed. These regulations secured effectually the public health, and prevented, in a very large degree, the forwarding of diseased animals to the herd-yards. The supply became of a better quality and at lower rates. Increased watchfulness on the part of the sanitary police, at the slaughter houses and retail stands, prevented the sale not only of unhealthy beef, but also of large quantities of other unwholesome meats.

WHAT IS DESIGNED AND WHAT SHOULD BE ACCOMPLISHED BY SANITARY INSPECTION AND CONTROL, AS REGARDS ANIMALS AND MEAT, IN THE CITIES OF THE METROPOLITAN DISTRICT.

When cattle dying of this new disease were found in the herd trains and market yards that supply the metropolis, the fact at once was painfully obvious that no regulations or officers, then existing, could discover and prevent the sale of any or all of the flesh of those dying and dead animals in the meat markets of New York and Brooklyn.

1. As regards the sale-yards and butcheries, there existed no system of inspection and no means of control with reference to the prevention of the selling and slaughtering of diseased animals.

2. There was a lack of any adequate means for officially inspecting and sanctioning meats after they are dressed for the market.

3. Except in connection with the statutes against rinderpest, there was nothing worth the name against any kind of exposure of diseased animals and against all sorts of cruelties and abuses in their transportation, yarding, and sanitary care.

Expert and careful inspection at herd and sale-yards, of all animals used for human food, is absolutely required at all times, as some form of disease exists at

every season of the year in the various kinds of animals so used. Authorized sanitary control and regulation should be permanently established and carefully and efficiently executed, not only as regards the herd-yards and butcheries, but State authority, with power to enforce regulations, should control and so regulate the transportation of animals as to present them to the markets in the most healthy condition.

WHAT CONCLUSIONS AND RESULTS HAVE BEEN REACHED.

The conclusions deduced from the experience of the past summer indicate the necessity for

First. Regulation and police control, under a uniform law, applicable to all the States through which pass the great transportation routes for market cattle, in order that the first evidences of any contagious disease may be arrested.

Second. Such control to have sufficient State authority to compel transporting agents, owners or their aids, to take proper care of their stock in regard to rest, feeding and watering, at stated regular intervals of time, during transportation and up to the time of slaughter.

Third. Skilled medical inspection at stated points; all diseased animals to be at once slaughtered or held under observation until all danger has passed. This inspection to be continued during the whole year.

Fourth. All animals at the slaughter houses to be critically examined at the time of slaughter, and the beef to be so marked that any consumer may be assured of its having been properly inspected.

Fifth. Such authority be given, that all diseased meat may be seized and disposed of in such manner as to prevent its being eaten. The results of such control and inspection will be the public assurance that danger to health and life from this source will be reduced to the least possible degree, that fraud and deceit will be under control, and that the aim and efforts of enlightened sanitary laws shall be supported and enforced.

CONCERNING SYMPTOMS AND SIGNS OF THE DISEASE.

Diagnosis. In studying the history of this disease the following points present themselves by which professional and non-professional observers can be guided in pronouncing the diagnosis:

1. The symptoms by which the disease is characterized in the infected cattle while living, and,

2. The signs by which it is recognized in them when dead or at their slaughter.

1. Animals suffering with this disease present the following obvious symptoms (see plate No. 1): Generally standing apart from their fellows; listless, indifferent to surrounding objects; restless, evidently desiring to lie down, but fearing to do so until compelled to yield by rapidly waning strength; the head hanging low down, frequently within an inch of the ground, or occasionally pressed firmly against some unyielding object; the base of horns hot; the ears drooping; the eyes dull and staring; the spine or back peculiarly arched; the hinder feet being drawn under the body and placed apart in a bracing attitude; a tremulous creeping over the flank muscles, with frequent efforts at voiding feces, which are generally small, hard and rounded, and covered with a bloody mucous, though there is sometimes considerable looseness of the bowels during some stages of the disease; frequently passing urine of a dark bloody appearance; the pulse is rapid, very soft and feeble; respirations frequent, and during hot weather panting without exertion; the temperature, both externally and internally, increased. Flies are also observed to adhere to the animals, who seem either unconscious of their presence or too feeble to drive them off.

2. The signs or pathological appearances presented upon post-mortem examinations:

When dead animals of this disease are examined, even three or four hours after death has naturally taken place, it is found that there has been such rapid decom-

position that the special pathognomonic signs have become almost entirely obliterated, so rapidly does the peculiar activity of this poison destroy vital tissues. It is only in the previous history of symptoms in connection with certain marks of destruction upon the dense, firm membrane lining the tubular and pyloric portion of the abomasum or fourth stomach, or "reed," as it is called in common parlance, that a positive diagnosis can be given.

But the signs as presented upon an examination at slaughter are so uncomplicated with post-mortem changes that the disease is pronounced unequivocally throughout the fluids and tissues.

1. A greatly increased temperature of the body and the blood, is an indubitable and most trustworthy symptom of this disease, for it is the first symptom discoverable; it is excessive and extraordinary in degree, and it marks this disease as a pestilential fever.

2. Upon opening the animal the muscular tissue is seen, of a dark red color; the fat is of a deep brown yellow, having in intense cases a green bronzed tinge. (See plate No. 2.)

3. The spleen is found enlarged; more or less engorged with dark-colored blood, softened frequently to a pulpy mass.

4. The abomasum, or fourth stomach, upon its inner tubular pyloric portion invariably presents sloughs, erosions and deep excavated ulcers of various forms and extent (see plate). There is usually accompanying these more or less inflammatory appearances of the larger and more vascular portion of this stomach (gastritis). The ulcerations, or rather the peculiarities that were found in the tubular portion of the rennet, or fourth stomach, and at the base of the longitudinal folds in that stomach, finally appeared to be a surer guide to a recognition of the disease than was the mere appearance and size of the spleen or the liver; the absolute tests by the minute examination of the liver, bile and spleen-pulp by the microscopist, and the historical and symptomatic history of the animal before death, being of course preferred to all other kinds of evidence. Yet to the practiced eye these ulcerations, sloughs and erosions served as trustworthy guides in deciding the nature of any case in which, for the moment, the other kinds of evidence were not accessible.

5. Kidneys generally enlarged; darker in color than normal; congested with blood; and the cortical substance usually softened.

6. The liver enlarged; increased in weight; generally fatty or waxy; its bile-ducts and radicals fully injected with bile; its color changed to a yellowish brown.

7. The gall bladder filled with a dark, thick, tarry or flakey bile.

8. The bladder distended with dark bloody urine.

9. The intestinal canal in its various portions, the ileum, cæcum and rectum, frequently presenting congested vessels under its mucous coat; its epithelium softened and easily scraped off with the finger.

10. The heart, muscular tissue sometimes found softened.

11. The lungs generally in a healthy condition; in some intense cases interlobular emphysema.

12. The brain in some cases congested and softened.

In pronouncing the diagnosis of this disease beyond all dispute, the revelations of the microscope place the final seal upon all this group of symptoms and pathological changes.

The blood, and bile, and liver, under this (microscopic) test give us a view of that factor which is the poison which has produced these changes and death.

MOREAU MORRIS, M. D.

III.

THE OBJECTS SOUGHT AND ATTAINED BY CORRESPONDENCE WITH OTHER OBSERVERS OF THE TEXAS CATTLE DISEASE.

The correspondence upon this subject was opened on the 10th of August, and upwards of one hundred letters of inquiry during the ensuing two weeks were dispatched to those gentlemen along the great routes of cattle transportation, from Kansas City and Cairo, to Toledo, Pittsburgh, Buffalo and Providence. From that period to December 1st, the correspondence has been maintained to such an extent as has seemed essential for the end in view.

We sought for precise and circumstantial records concerning the arrival of cattle, at any period, sick and dying with the disease; secondly, circumstantial accounts of each outbreak of its infection in native herds; thirdly, dates which would establish in each case the length of the period of incubation of the infection in herds which became its victim; fourthly, descriptions of the phenomena and the results of the disease; fifthly, to trace the disease back to sources whence it came.

As neither the limits nor the objects of this report permit the introduction of our correspondence in bulk, we will here present such extracts from it as seem best adapted to throw light upon the history and progress of the infection.

Under date of August 10th, Dr. Edwin M. Snow, the Superintendent of Health in Providence, Rhode Island, communicated the following facts:

On Tuesday last (August 4th), 33 head of Illinois cattle were purchased in Albany by Messrs. Moore and Perkins of this city. These steers were sent by railroad, and arrived at Providence at 3 p. m. on Wednesday, the 5th. They were driven to a pasture, and were supposed to be entirely well. On Friday one of the animals was found to be sick and was killed, and on Saturday and Sunday (August 8th and 9th) six died in the pasture. All the animals that have died have been boiled up for their fat. All these cattle were raised in the State of Illinois. There were no Texas cattle in this lot.

Two days subsequently (August 13th), Dr. Snow writes:

The owners have voluntarily given them into my control, to do what I please with them. Eight of the ten now living were very low with the disease, but an astonishing rapid change has taken place, and it now looks as if they would recover.

Under date of August 14th, Dr. J. H. Rauch, the Sanitary Superintendent of Chicago, began to forward to us daily accounts of the progress of the disease at the herd-yards of that city. On the 17th of August he wrote as follows:

We have had the disease in our fifth ward since August 1st, and for the last two weeks Dr. Manheimer, one of the Sanitary Inspectors, has been making observations upon it. I have disinfected the yards where the Texas cattle have been. In Dr. Manheimer's inspection district (fifth ward), 63 cows have died; and I have learned of several new cases this morning.

On the 16th of August, Dr. J. T. Hodgen, President of the Board of Health in St. Louis, wrote as follows:

* * * The day before your letter was received, our health officer called the attention of the Board to the fact, that a very malignant disease was prevailing amongst native cattle brought to our city. The disease has manifested itself at but one stock-yard, and that at which most Texas and Cherokee cattle have been received, and in pens in which these southern cattle have been kept.

Yesterday a post-mortem was made of one that had died of the Texas disease. The health officer found the liver engorged, also lungs. The spleen enlarged and softened, and the kidneys disorganized masses, not showing a trace of original structure. The symptom was, an uneasiness for a few days; this increased to almost a fury, the animal moving rapidly for a short distance and then standing, then a tremor and marked debility, it finally fell and in a few hours expired.

Other examinations are being made to-day, and will be continued until we are satisfied of the pathology of the disease.

We have ordered the use of carbolic acid in pens in which Texas and Cherokee cattle have been kept, and appointed inspectors of all cattle. We shall allow none to be killed without the inspector's brand and certificate.

Under date of August 19th, Dr. E. E. Mackey, the Health Officer of Buffalo, wrote:

MY DEAR DOCTOR: I fully concur with you, in the expression of your fears, that the many important and much desired facts pertaining to the cattle plague now raging, will never be studied out to our satisfaction and enlightenment.

[Senate No. 9.]

On the 10th of August there were received at our yards 50 head of Illinois cattle, 13 of which showed unmistakable symptoms of infection, and these symptoms were striking and peculiar in their nature. The animals appear to be very dejected, head drooping, eyes watery and wild in their expression, pulse very frequent and full, respiration increased in frequency and the breathing labored. The secretions from the mouth and nose, in three of the cases, were of green, frothy or slimy appearance. The unsteady gait of the animals is mostly confined to the hind extremities arising from what appears to me paralysis, or partial paralysis of the muscles, and a deficiency in the power of co-ordination; indeed, so marked was this symptom in three cases as to preclude the possibility of the animal's rising. The temperature increased and emaciation very marked. I cannot say how long they would have lived, as I deemed it safer to have them immediately slaughtered. Post-mortem examination showed the respiratory organs and the heart to be healthy, no structural change having taken place; the gastro-intestinal canal very much inflamed, and found to be in many places softened; the liver normal; the spleen very much enlarged, softer and more easily broken down than in health. * * * The urine coagulated on the addition of nitric acid, or on the application of heat. It may be of interest for you to know that, so far, the disease, as it has made its appearance here, has been confined to Illinois cattle; *not one* Texan animal, out of the large number that have been received here, has shown any discoverable or obvious symptoms of infection. In answer to your several points, I will say: (1st) That all my endeavors to obtain any reliable information, beyond the mere fact of these cattle being of an Illinois stock, have proved fruitless, and I am therefore without any data by which to judge. (2d) Of the cattle in quarantine four showed obvious symptoms of being diseased two days after their arrival, and on the third day showed unmistakable signs of the presence of hæmaturia; three others that have since been attacked with the disease were immediately killed, and no observation was made upon the state of the urine and the bladder. (3d) Out of the seven head killed, while in quarantine, four were discovered to be infected two days, and the other three or four days, previous to any obvious symptoms showing themselves. (4th) Two dogs were fed upon the diseased flesh, and no other effect noticed than the ejection of the same shortly afterward; in neither case would their stomachs retain or digest it. I am of the opinion, from the testimony I have been able to collect, and the little experience I have had with this infection, that there would be much danger incurred from eating the flesh and drinking the milk from these animals. It seems very improbable to me that so much gastro-intestinal disease, as I have seen in all these cases, can be due to any other cause than the presence of some violent irritant. I will communicate further on this subject.

(Signed)

Respectfully,

E. E. MACKEY.

Dr. Rauch, the Sanitary Superintendent of Chicago, wrote on the 19th of August, a full account of the procedures that were being taken by the Board of Health in that city. He inclosed the following account of Dr. Manheimer's investigations in the "infected district" (Fifth Ward):

The increased mortality among the cows is found in a limited district of from two or three miles square, well defined on the south by Egan avenue and the stock yards, north by Archer avenue, east by Wallace street, and west-south by the south branch of the Chicago river. Outside of these limits, until this time, no sickness or deaths have occurred. The region, then, where the disease makes its appearance is the immediate vicinity of the cattle yards.

The first cases were noticed on Decoring street, near Egan avenue, and from thence it extended, in a short time, to the above described limits; the largest number having died on Egan avenue, Douglas place, Main street and Hamburg, near the cattle yard, so that, from the 2d to the 15th of August, sixty-three cows and one steer died. The cause of the sudden spread of the disease is, so far, not yet satisfactorily explained by the investigations made.

It seems that native cattle do not communicate the disease to each other, as in many instances cows were housed in the same stable with sick cows without being infected. With but few exceptions, all these cows became infected and died that grazed near the cattle yards, and in localities formerly occupied by Texan cattle, drinking of the same water used by the latter, and which may have become impregnated by their urine and excrements. (This water runs from the cattle yards to Egan avenue.) In a circuit of about two miles only one cow escaped the disease, and that one was kept in the stable for the last three weeks.

All, taken together, tends to prove that the origin of the disease, or the cause of the same, is to be found in the Texan cattle that had been in the cattle yards and grazed in their immediate vicinity.

The symptoms of this disease, in the outset, are varied, as many of the cattle, from the beginning of the attack to the time of death, are quiet and in a lethargic state, evincing no signs of pain; while others are very uneasy, constantly moving about and lowing, until they drop down exhausted, where they remain until dead.

The following symptoms are noticed in all cases that have fallen under my observation: In the beginning of the disease there is an uncertainty of step and trembling, showing an inability to

remain standing on the feet, and with a disinclination to move; the head drooping. The appetite does not seem to be impaired, nor is there any unusual thirst; the skin is alternately hot and cold; the secretion of milk is diminished, and about the fourth or fifth day a marked change in the appearance of the animal takes place. The abdominal walls are shrunken, the animals becoming lean, breathing quick and short, and do not have strength enough to raise themselves, and when raised, cannot remain in that position for any length of time. The secretion of milk decreases daily, the secretion continuing until death, and is of a thick creamy character. The secretion of urine is also changed, the animal having a constant desire to urinate, succeeding, however, in ejecting only a small quantity of bloody urine. The faeces are discharged with great effort and are dry and hard. In this state, the diseased animal lingers for a shorter or longer time, until it finally expires under appearances of exhaustion. The duration of the disease is from two to seven days.

Up to this time I have not been able to make as many post-mortem examinations as I desired, owing to the great anxiety of the owners to remove the carcass of the animal as soon as possible; and, owing to the few dissections I have made, cannot as yet arrive at any satisfactory conclusions with regard to the character of the disease. The following is the result of post-mortem examinations made: An unusually early rigor mortis takes place (from one to two hours); abdomen much distended by gas; brain anæmic and soft; respiratory organs, found mucous membrane lining them, in an anæmic state; in the trachea, I found, upon opening, a quantity of mucus. Lungs pale and at the base small hypostatic deposits; found no coagula in the heart, but from one to two ounces of thin blood, presenting an anomalous condition, as when the animal is for a long time dying, coagula are nearly always found. The muscles and valves of the heart were in a normal state. The stomach filled with dry, solid and half-digested food, want of secretion of the stomach; small intestines filled with bloody serum. The large intestine filled with a dry, solid and half-digested mass. The capillaries of the mucous membrane are injected, and small ecchymosed patches were found in the intestines. The annular veins of the muscular coat of the intestines engorged and enlarged. Spleen increased in length to twice its natural size, its peritoneal covering smooth and stretched tightly over it. Color darker than usual (a blackish brown). Texture friable. The microscope revealed that the structure of the spleen had been totally destroyed, so that the normal elements of the spleen, viz., the corpora malpighii blood corpuscles, and its peculiar networks were no longer to be distinguished. Liver slightly enlarged. The liver cells contain a small grained substance, similar to the commencement of fatty degeneration. Gall bladder much enlarged and filled with light green, fatty-looking gall; bladder much enlarged (nearly twice its natural state) and filled with a large quantity of bloody urine; blood very thin, and seems to contain less red corpuscles than usual.

This valuable and instructive record by Sanitary Inspector Mannheim, was accompanied by the following statement from Dr. Rauch. That he had that day examined a number of cattle at slaughter, which, in the yards, while living, did not present to his eye any positive symptoms of sickness, "but after examining the spleen, liver and contents of the bladder, he found in many of them decided evidences of disease," and he further states: "I accordingly condemned the herds so far as slaughter and sale is concerned, and shall allow no cattle to be sold as food unless inspected both before and after death." This important and judicious decision by Dr. Rauch was sustained by the Chicago Board of Health, and, after consultation with Prof. Gamgee, a plan for inspection was adopted, which we shall mention elsewhere. In his letter of the 19th, Dr. Rauch informed us that the Chicago authorities had decided not to allow Texan or infected cattle to be brought to that city, and that such cattle, when found at Chicago, would not be allowed to be sent elsewhere. This action was fully in accordance with the desires of the Metropolitan Board of Health as regards the course which it was hoped the authorities of the State of Illinois, especially those of Chicago, would take.

In a communication received from Fort Wayne, Ind., and dated August 19th, the following was forwarded to the Metropolitan Board of Health for its information. The action referred to is dated August 10th:

Upon information that some 40 head of cattle arrived here in a sickly condition, so that they had to be killed, we find, upon investigation, that there arrived here about the above-named number of cattle in so bad a condition that they had to be killed, but that *they did not suffer from the so-called cattle disease*, and that the carcasses were delivered over to the soap factory and none of their meat exposed for sale.

At a special meeting of the Board of Health, held to-day, it was

Resolved, To notify Mr. Benton, the stock-yard keeper, that the Board wishes to be informed if any more sick arrive, that they may personally inspect the same.

Resolved, further, That it be the duty of the individual members of the Board to occasionally inspect the cattle yard during the hot season.

Dr. Rosenthal, the Secretary of the Board of Health at Fort Wayne, wrote to us on the 19th inst., and stated that the testimony upon which the above-mentioned conclusion of their Board had been based was "taken from persons who may not be able or willing to give the real facts, the carcasses having been removed before we could inspect them. You will see that in the future we shall be very strict, and inspect all cattle arriving here *that are reported sick*. We will also publish that part of your communication relating to the care and transportation of cattle, as well as the suggestions in regard to disinfectants."

The Mayor of Pittsburgh wrote as follows:

MAYOR'S OFFICE,
PITTSBURGH, Pa., August 23d, 1868. }

E. HARRIS, M. D., *Corresponding Secretary Metropolitan Board of Health, New York:*

DEAR SIR: In answer to yours of the 18th inst., I would state that our cattle yards at East Liberty, and elsewhere in this neighborhood, are free from all infectious disease, and no further alarm exists on this subject. Our cattle inspector, Mr. Hosack, is very vigilant, and has taken every precaution against the spread of the cattle disease here. I have advised him of the tenor of your letter, and he informs me that he has received a communication from you which he will answer in detail as soon as possible.

Mr. Hosack, the Inspector referred to by Mayor Blackmore, wrote as follows:

SIR: * * * The only cattle that were affected were the two droves from Illinois. I cannot inform you when or where the disease first showed itself. I discovered it on the arrival of the train. All the cattle on that train were more or less affected. After their arrival they were placed in the stock yards near other cattle, in fact I can say they were surrounded by other stock, but in no one instance did the disease show itself save in the two herds above spoken of.

Out of two herds from Illinois (that arrived the first days of August, one of which was Mr. Alexander's that you saw at Communipaw), 46 died between Crestline, Ohio, and this city, and 94 died or were killed after their arrival.

There were 264 in the two herds when they reached this city. The balance was shipped over the Pennsylvania Central railroad as diseased cattle. The Railroad Company telegraphed to all points along the line of the railroad that they were en route. They were shipped on one train, no other cattle being allowed on that train.

(Signed)

Yours respectfully,

WM. HOSACK, *Cattle Inspector.*

[NOTE.—The second herd was switched off at Harrisburgh, Pa., and sent southward.]

The subjoined extract from a letter received from the Mayor of Altoona, Pa., the headquarters of the Superintendent of the Pennsylvania Central railroad, correctly illustrates the same hearty cordiality that is shown by the letters just quoted. It was deemed important to have all needed sources of information on the great railway lines of transportation readily within our reach, and to know the truth by frankly asking such questions as we desired. It is now known that many thousand head of cattle from the infected districts were kept back from transportation at the time when it was perilous to move them, and that this silent action in New York prevented both losses and panic by eliciting as it did the kind of inquiry and sanitary supervision which were then greatly needed:

To the Registrar Metropolitan Board of Health:

DEAR SIR: Your communication dated August 19th came duly to hand, and upon its receipt I called a meeting of the City Council to give advice in the premises; and they, by unanimous vote, directed the Mayor to reply.

Your communication relates to two points upon which you ask for information: First. The condition of native and Texas cattle which arrive here. In answer, we reply that until the present time our cattle were entirely free from this infection, and we doubt not this will continue to be the case, from the fact that our city butchers are all men of character. They would not be guilty of so foul a crime as to slaughter diseased cattle and impose it upon the public for food. Second. Touching the course pursued by the Pennsylvania Central Railroad Company, in transporting beef cattle over their line of railroad from Pittsburgh to Philadelphia, it gives us pleasure to state that our meeting was honored with the presence and counsel of Edward H. Williams, M. D., the present efficient Superintendent of the road. He assured us, and authorized us to assure you, that the company have not, nor will they receive for transportation eastward, any beef cattle which have not undergone a strict examination by a commission of health officers, and also competent men of their own appointment, at their drove-yards at Pittsburgh; and for fear any taint of disease might break out on the way, they are re-examined again at Harrisburg, the capital of this State, by a similar commission. From that point, the Pennsylvania Central Railroad to Washington *via* Balt

more, and the New York road *via* Allentown, diverge from the Pennsylvania railroad, and if any diseased cattle are here found, they are disembarked and dealt with according to State and municipal laws.

Yours respectfully,

(Signed)

GEORGE POTTS.

MAYOR'S OFFICE, ALTOONA CITY, PA., August 22d, 1868.

Town authorities likewise gave information of the existence and progress of the disease at various points in the West. The town of Onarga, Illinois, for example, sends the following:

There has not been a case of disease, to my knowledge (and I think I am posted), within sixteen miles of our place. At Loda, a railroad station about sixteen miles south from here, there was a load of Texas cattle unloaded from the cars and driven east across the country to Indiana, which, I believe, is the northern limit where the disease has been. The native cattle there, having communication with the Texan cattle, or herded upon their track or herding grounds, have become diseased, and it has been very fatal, sweeping off nearly whole herds. The cattle in pasture along the track have not been affected. One farmer who had his stock, a part in pasture and a part on herding grounds (open prairie)—those herded, many of them died; he then put the two herds together in pasture, and not a case occurred among those that had been pastured.

The manner in which the Texas cattle communicate the disease to the native cattle, is a question not yet settled; the facts are, that the native stock do not seem to give native stock the disease, but that Texas cattle do give the disease to native stock while in apparent health. And native cattle herding on the herding ground of the Texas cattle, or herding on land where the Texas cattle have been driven over, do take the disease, and it has been fatal in most cases.

The largest estimate of the number of cattle having died from this disease in this vicinity, is about eighteen hundred, and the disease has shown itself only where the Texas cattle have been.

The authorities have taken every precaution to stop the spread of disease. The diseased herds, and also the Texas cattle, are confined to their present localities, and heavy fines and imprisonment have been imposed for bringing into or driving through the territory not already infected. The people are determined that the disease shall be confined to its present limits, and I think the disease has nearly spent itself, and, as soon as we have frosts, it will entirely disappear.

By the approval of the president of the board of trustees of the town of Onarga.

Respectfully yours,

(Signed)

E. C. HALL,

Clerk Board of Trustees.

The following letter proves how intelligently the leading agriculturists in the West have communicated the results of their observations:

ODELL, Ill., September 11th, 1868.

E. HARRIS, M. D.:

Dear Sir—I had the honor to receive your communication a few days ago. It is certainly gratifying to know that science has been called in to assist in solving the problem presented by the appearance of the plague; and although I make no pretensions to scientific ability, yet I may possibly assist you by giving, in answer to your questions, the results of my experience and observation.

In answer to your first question, as to whether I have seen any thing which would warrant me in believing that native cattle have propagated the cause of this disease, I would say that I have not. During fifteen years' experience in stock raising, I have never, until this summer, witnessed any malady bearing the slightest resemblance to the disease in question. In fact, I have never before seen any kind of infectious disease among western stock.

2. I have seen no indication of this disease among cattle arrived this year from Texas, and though numbers of them die when brought here, yet, as far as my observation goes, I consider their death the result of fatigue, and the want of proper care.

3. No case of the kind has come to my knowledge.*

4. The general effect upon milch cows is the same as upon other stock. In most cases the flow of milk is almost instantly stopped. In two cases which came under my observation of "cows with calf," the disease culminated in abortion, which was followed by immediate convalescence of both animals. Allow me to add here, in reply to an inference drawn from questions four and five, that, in proportion to the number of all kinds of stock exposed to infection, more milch cows and beef cattle died than of other kinds. May we not presume that animals, in which the secretions of fat or milk predominate, are more subject to attack than others?

5. Milch cows seem to be very susceptible. Calves are not so. Not in a single instance have I known of a calf dying of the disease. Stock of a year old and over, are not exempt from its ravages, neither does the breed make any difference.

* Question 3, in my letter to Mr. Atkins, was: "Has any case of this disease occurred in Texas stock that has wintered over in your State?"—E. H.

6. The only evidence I have that cars may become infected is, that *every* spot in this vicinity whereon Texas cattle have been, has teemed with death to our native stock. Permit me to use the common expression, "*I would not give a postage stamp for a car-load of cattle shipped from here to your city in a car, if a single Texas beef had been in the car for only one hour at any time from the first day of May until the first of November.*" So slight a contact is necessary to contract the disease that I have known cattle to die of it that had only been driven *across* a road along which Texas cattle had passed. Can any reason be given why cars may not become infected? Knowing what I do know of the nature of the disease, I do not hesitate to say, that cars in which Texas cattle have been transported during the summer months are *recking* with invisible death to our native cattle.

7. The length of time from exposure to attack varies from fifteen days to three months. My experience leads me to believe that hot weather will accelerate the progress of the disease, while cool weather will retard it; and an extended season of low temperature will effect a cure. The time from attack till death is from three to seven days, as near as can be ascertained.

8. To the best of my knowledge, the first appearance of the disease in our county was on or about the 10th of August, and in the State about a month earlier. In our county the deaths number, as near as I can ascertain, ninety-eight; of the number in the State I cannot at present tell, though it must amount to thousands, for the scourge in our county has been light, compared to what some neighboring counties have experienced. The number of recoveries, known to me, is ten, in our county. The proportion that sickened to the whole number exposed, has been as one to two and one-half; or as two out of five.

9. In our county (I might say in our township, for it is the only place in the county where the disease appeared), we estimate the loss at five thousand dollars; but I have no data from which to determine the loss in the State.

10. All that died were exposed to infection from Texas stock; so were all that are now living; which, with the exception of the ten mentioned in answer eight, escaped attack.

The route by which Texas cattle are brought into our State during the earlier part of the season was by Cairo, and thence they were shipped on the Illinois Central railroad to Chicago. Later, they entered the State at Alton, and were transported on the Chicago and St. Louis road to Chicago. Formerly, Missouri and Kansas suffered from the disease, occasioned by the introduction of those cattle. Within a year, however, mob law has kept them out of those States, and as there had to be an outlet for the stream of cattle from Texas, the tide was turned through Louisiana to the Mississippi, up which stream the animals were transported until they reached our borders, then turned inland to spread a contagion which has baffled the skill of the most experienced men.

In conclusion, I would say that I have *no reason* to believe that native cattle, even under circumstances the most favorable for infection, will infect other native cattle. Not *one* of the many I have seen die of this disease but that was exposed to infection from Texas stock; and not *one* of those in this vicinity, now living, but that was exposed to sick native cattle. I have seen a calf, which is now living, and in good health, that was suckled in succession by three different cows which died of this disease in its most aggravated form. The little animal drew its food from them while they were sick, and when the first died it was given to another, and so on, and the process had no deleterious effect upon its health. It had never been exposed to infection from Texas cattle.

Hoping what I have written may be of some service to you in your endeavors to ascertain the nature and laws of this terrible disease, and to prevent further damage, I subscribe myself,

Respectfully yours,

FRED. A. ATKINS.

The subjoined note, from the pen of this very intelligent farmer, shows what very ample grounds he had for the opinions expressed in the foregoing letter. This note was published in *The New York Evening Post*:

ODELL, Livingston Co., Ill., August 31st, 1868.

* * * * In the vicinity of my residence is a parcel of vacant prairie, containing about twelve hundred acres, which is used in common for pasturing stock by those farmers who live near by it. For several years past this has been the custom, and during the time there has not been the slightest indication of any epidemic disease; but, on the contrary, the cattle have been remarkably healthy, and the land has been peculiarly adapted to grazing, it being well supplied with water, and an abundance of nutritious grass.

On the 25th of June last, about four hundred head of Texas cattle were unloaded from the cars at Odell, and driven to the prairie above mentioned, and they were there herded until the 28th, when they were re-shipped for Chicago.

At the time those Texas cattle were here, there were one hundred and forty-seven head of native cattle being herded upon the same ground. This number was divided into three herds. In one of these, containing twenty-seven head, the disease appeared on the 10th inst., and it did its work so rapidly, that in just two weeks from its first appearance, twenty-four out of the twenty-seven were dead. Of nineteen head of blooded stock owned by the writer, only nine are now living, ten

having died in one week. Such has been the rate of mortality among the remainder, that of the one hundred and forty-seven head above mentioned, sixty-six have died in three weeks, and, as near as can be ascertained, about one-fourth of the remainder are sick, beyond hope of recovery.

The figures I have given will serve to show the terrible malignity of the disease, and the certainty with which it accomplishes its work. Not only in this locality has the truth of my statements been manifested, but at Bloomington, below here, and Gardner, above, the result of the contagion has been the same. At both these places Texas cattle were unloaded from the trains; and at intermediate stations, where no disembarkation occurred, the native cattle are free from disease.

No better observations upon the cattle disease could be made than those by the intelligent gentlemen whose letters we have just quoted. The experience of the intelligent agriculturists who, like Mr. Atkins, necessarily have had every incentive to seek for the true sources of the poisonous infection by which their herds were imperiled, and in some instances, swiftly destroyed, impelled them to ascertain the truth upon this subject.

The subjoined extracts from letters received from Dr. Thomas L. Neal, the efficient health officer of Dayton, Ohio, contain important testimony upon the subject of these inquiries. Under date of August 25th, he wrote:

DEAR DOCTOR: I received your letter relating to cattle disease in due time. Up to that time we had no indications of trouble in our midst, there being a herd of Texas cattle left a few miles from us, in due time we were doomed to suffer the same penalty which seems to follow these same pestiferous "long horns."

There are over a hundred Texas cattle grazing in a large field (over two hundred and seventy-five acres), where they have been since the last of June. Up to about 15th of August, no natives were infected; since that time eleven natives have died, and several others are sick.

Yours, very truly,

THOMAS L. NEAL.

(Signed)

In a subsequent letter he gives the history of this infection, as follows:

The farm on which it occurred is nine miles from the city. The first native to fall sick was a steer, three years old. This occurred on the 16th day of August, and precisely forty-seven days after any possible exposure to pasture or paths trodden by the Texas cattle. The owner of the Texas stock, in order to make a short cut, drove his Texans through the field where this steer then was grazing. This foreign stock was less than one and one-half hours upon and passing over that field. In the field thus exposed, there were one bull, eight steers, six milch cows, four heifers and two yearlings (one a steer and the other a heifer). Among those to sicken (and die, as all did), there were the yearling (steer), the yearling (heifer), two steers (two and three years old), and five cows (three, four, two, six and seven years old), nine out of twenty-one. There were six other cows in the same field with the Texans, all of which died, save one, and by the way, the only one to sicken and not die, within five days. It has *not yet* fully recovered.

No instance occurred where a native contracted the disease which had not been exposed directly to the ground where the "long horns" had grazed. No ages or conditions (except the bull) seemed to possess immunity, as far as these observations extended. All of those dead were well-bred. The bull, however, was a thorough-bred Durham.

The first symptoms observed here were the drooping head and arched spine, and the tucked-up appearance of the flanks; the hair is lifeless; slavering, and from the first, with the cows, drying up of the milk. The droppings hard and dry, and covered with mucus almost from the first, and a constant symptom; bloody urine. An early increase of animal heat; I did not take it, but there can be no doubt it was much above the normal standard. The gait was tottering, and a want of co-ordination occurred with all the cases I saw. Twitchings of the muscles, and a tremulous movement affecting the entire animal, but particularly the hinder parts. The animal "falls away" from the very commencement. As you ask for the "earliest symptoms," I shall not further particularize. There may have been some premonitory symptoms I failed to become possessed of, but from the first indications of illness observed the duration of the disease was from three to five days. "The death-rate in total exposed," as nearly as I can ascertain, is about fifty per cent. As before stated, fifteen sickened and fourteen died. The post-mortem examinations were not made under my immediate supervision, and as they are not satisfactory to myself I will not trouble you with them.

Yours truly,

THOMAS L. NEAL.

(Signed)

From Cincinnati, Ohio, the last week in August, the following facts were received: On the 19th of that month the health officer received information that the cattle disease was prevailing in herds of cows near Cuminsville. A Mr. Hogan had pastured eight of his milch cows at Jones' wood, where a herd of sickly-looking

Texas cattle had been pastured during the latter part of June. Mr. Hogan's cows began to pasture there some time in July. Seven of these eight cows died within three weeks after beginning to pasture there. A Mr. McCracken also pastured twenty-nine of his milch cows on the infected grounds near Jones' wood, and in about ten days from the time they commenced to feed there the sickness appeared and in the course of a few days thereafter nearly all the cows had died.

An abstract from the official report of this outbreak near Cincinnati, by Dr. Clendenin, the Health Officer of that city, is here subjoined:

On the 3d of June the last herd of Texas cattle were brought to Cincinnati, over the Ohio and Cincinnati road, and were put into stock pens. They remained there over night only, and, on being inspected by our meat inspectors at that place, they were found to be very poor, and covered with ticks. They were ordered to be taken out of the pen and out of the city, as they were unfit for food, simply because they were so poor. They were taken to Jones' wood pasture, eight miles from the city, where they were kept two days, and then brought back to the city. In the meantime there was a drenching rain, and the cattle were pretty well washed. They were put into pens at the Brighton stock yards, where they remained, perhaps, twenty-four hours, when they were removed for the second time to Jones' wood pasture, where they remained some three weeks and were fattened up.

On one occasion some of these animals stampeded when going to water, and broke into the grounds and gardens of the village through which they passed. The animals with which they came in contact, or that were kept on the grounds over which they passed, took the disease and died. These facts I know, for I followed up every single case myself.

These animals were finally spirited away and killed, I presume, for the Cincinnati market. As they were outside of the city limits, our inspectors claimed that they had no control over them.

Within ten days after the herd was removed from Jones' wood twenty-nine cows were put into the same pasture, where they remained, I think, about a month, when the owner observed that the animals were ailing, and the symptoms described by the gentleman from New York (Mr. Gould) were precisely those presented by these animals; that is to say, the first manifestations were drooping of the head and ears, and that marked stare which he so well described. In the early stages of the disease the animal sought the water, lying down in it, and plunging in the nose and face up to the eyes, holding the head in that position as long as was possible without taking breath. This was only during the early stages of the disease. During this time the temperature of the body was increased, as proved by actual observations made by the thermometer. They would then leave the water, and within four days from the time of the attack every single one of them died. I have examined twenty-four of those twenty-nine cows, every one of which died within ten days. I did not find any disease of the rectum, as Mr. Gould has described; that I found perfectly healthy. If there was any change, it was perhaps a little paler than natural.

I found one symptom to which the gentleman did not refer—interlobular emphysema—infiltration of air between the lobes of the lungs. That existed in every case, and in some cases was very marked.

There were two cows that were particular favorites of one gentleman who desired to save them. They were but slightly affected, and his own opinion was, that they were not at all. He took them from the herd and put them in a lot near his house, in which were two pet cows which had been kept entirely separate and apart from the Texas cattle, nor had they been brought into contact with his own diseased cattle until those two cows, on manifesting the first symptoms of the disease, were put into the lot with them.

Under date of September 7th, Dr. J. F. Hodgen, President of the St. Louis Board of Health, communicated the following statement to us:

In April, 1866, a lot of three hundred Texas cattle were shipped on the steamer "Lizzie Gill" to St. Charles, on the Missouri river, and thence driven to Lincoln county (about fifty miles). The stock stopped three nights on the way. In two weeks after they passed, native stock was taken sick and died, and continued to do so in those localities during the summer. * * * * Dr. Mattson and his partner bought, last season, a lot of cattle (native, fifty), and put them in a lot where Texas cattle (healthy) had been fed. In ten days or two weeks they began to die of Texas fever, and continued to do so until the end of about three weeks, when he removed what remained to the country and gave them green food; only a few, and those were already sick, died.

From the observation of our health officer the same thing is indicated. Cattle running about the stock yards where Texas cattle are received are affected, while others near by, but kept up closely, are not diseased.

It is clear to my mind that the disease is propagated through the excrements (droppings); that these, perhaps, come in contact with the food, and are taken by native cattle; or, as in one case, the grass growing on soil impregnated by the excrements is capable of bearing the seeds of disease. At any rate, there is one very well authenticated case in which a lot of cattle were put in a

pasture in May that had been occupied by Texas stock in March, and these native cattle had the Texas fever; though in this case it may still have been that by nipping the grass close to the earth some of the excrements may have been taken into the stomach.

I think it would be well to send a commission to the south-west next spring, and provide for an extensive series of experiments with a view to learn by what agent the disease is transmitted. If we could be sure that it was due to droppings alone it would not be a very difficult matter to guard our soil.

(Signed)

Respectfully,

JOHN T. HODGEN.

The health officer, under authority of the St. Louis Board of Health, at a later date communicated the following facts through the Secretary of that Board:

* * * * * The disease appeared with the early transit of cattle east, and gradually increased until about August 1st, then declined, and on September 17th there were few or no cases occurring. I would also remark, for the information of Dr. Harris, that the disease prevailed here almost exclusively among milch cows. The stock yards during the summer were in a healthy condition. The native cattle transported in the same cars that had been used for Texas cattle were not attacked by any disease here, the disease probably developing itself after they had passed on further east. A few instances—not more than five bullocks sick and dying in transit—came to my knowledge. It was among our milch cows that the great mortality took place. In all cases the animals were permitted to run abroad, and as the open pastures in the outskirts of our city that they frequented for food were almost daily traversed by Texas cattle, it was there, I conceive, that the seeds of the disease were obtained. I met with or heard of no cases among cows kept confined either to stables or their own pastures, except one instance. A large dairyman, in June, purchased some forty head of cows in Illinois. Shortly after arriving at his farm a disease appeared among them from which they died rapidly. The disease did not show itself among his old stock; this may have been due to the segregation of the Illinois or sick ones.

From the best sources of information at my command, I would say that the disease has never wintered over here. Cold weather destroys the germ as effectually as it does that of yellow fever, and it is only on the advent of Texas cattle that it appears again. During the war there were no Texas cattle and no disease.

Cherokee cattle are accused by drovers of carrying the disease, whether justly so I cannot say.

I speak of the disease among our milch cows as the "Texas disease," but whether it was the same that formerly attended the passage of Texas cattle I cannot positively say, as no correct descriptions of the disease as it formerly appeared could be obtained. I can neither say it was identical with that disease as it existed the past summer in various parts of the country. The various reports, as made up in various parts of the country, must be compared before this can be determined. Of one thing I feel convinced, viz., that I have traced the disease here in many, many cases to a Texas poison—i. e., that all the sick had frequented the trail or passage way of the Texas cattle, and that there they received the germs that caused their death. * * * * *

From my own observations with the scalpel alone, the organs most usually diseased were the kidneys, spleen and liver. Without entering into a description of the changes found in these organs, I would conclude by stating that the disease seemed to be one of blood poisoning, the result of a special germ imparted in some way by Texas cattle. That no one organ was invariably and similarly affected in all cases, and although the kidneys, spleen and liver were in all instances more or less affected, yet one or the other of these organs would seem to have been *especially* attacked in different cases.

Very truly yours,

JAMES W. CLEMENTS, M. D.,

Late Health Officer of St. Louis.

The Mayor of Akron, Ohio, communicated to us the following information, under date of September 10th:

* * * * * In reply to your inquiries, under date of August 16th, I informed you that we had not seen a case of cattle disease in this part of Ohio. By the enclosed statement you will perceive that it has broken out in this and an adjoining county, through which Texas cattle were driven. These cases have proved the disease to be communicated by cattle being driven over a road upon which diseased cattle have traveled.

Respectfully,

L. V. BINN, *Mayor.*

To Corresponding Secretary and Registrar M. B. H.

The following is an abstract of the facts alluded to, and furnished by this intelligent executive at Akron:

About two months ago a drove of some ninety head of Texas cattle were driven through the north part of this county, Northfield and Twinsburg, on the way to Mantua, Portage county, where the owner thereof, a Mr. Frost, resides, and where said cattle are now being kept. While in attendance at the fair at Twinsburg, on Thursday last, we learned that the disease in question had broken out upon the farm of Mr. G. W. Dresser, on the line between Twinsburg and Northfield, near Macedonia, at which point said Texas cattle had made a slight halt upon their journey; while it was

asserted by some, and denied by others, that large numbers of the Texas cattle had also been stricken down with the disease upon the farm of their owner in Mantua. Desiring to ascertain the facts in regard to Mr. Dresser's herd, in company with M. C. Reed, Esq., of Hudson, and J. P. Alexander and R. B. Walker, of this city, we visited the farm of Mr. D., who kindly gave us all the information in his possession in regard to the matter.

It appears that a tenant of Mr. Dresser, living upon the north side of the east and west road, by the name of Maloney, having three cows which he had allowed to run in the road, had lost two of them suddenly by the disease in question a few days previously; while one cow out of the large herd of dairy cows owned by Mr. Dresser, which, in going to and from pasture, had passed over the track of the Texas cattle, had also died from the same disease the day before, after two or three days' illness only.

From M. C. Reed, Esq., of Hudson, Ohio, after a personal visit and examination at the place infected by the disease, we received a full account of these cases in Summit county. Though Mr. Reed went about this inquiry fully persuaded in his own mind that it was only an endemic and local disease, the following points are so well stated and so instructive that we present them to show how well the Summit county outbreak corresponded with all that we know concerning the propagation of this malady. Mr. Reed says:

* * * * * The Texas cattle were taken from the cars at Brighton, about the 1st of July, and were slowly driven by way of Independence, Bushnell, Northfield, Twinsburg, Hudson and Aurora, to Mantua, where they now remain. The pastures were short and poor on account of the protracted drought, but the feed was more abundant along the sides of the roads, our laws restraining animals from running at large being generally well obeyed. The men in charge of the Texas cattle herded them at night in yards, etc., without feed, and then, during the day, permitted them to feed in the streets.

They reached Northfield July 4th, and the drovers permitted them to feed some time in the street, and at night shut them up in yards on Mr. Dresser's farm. They started them early in the morning, but again permitted them to feed for some time in the street. Within about fifteen minutes after these cattle were turned out of the yards, Dresser's cows were driven into it to be milked. A near neighbor, a Mr. Maloney, had at the time three cows and a calf running in the streets. About the 1st of September the disease appeared among these cattle, and they were also found to be covered with the ticks. All of Mr. Dresser's cows, when I saw them, had more or less of the ticks on them, not a large number that were fully grown, but a multitude of small ones; some of the cows in apparent good health having many more of them than those that took the disease. He lost two cows; one died, the other was killed after the case became hopeless. I was at his farm yesterday; his cattle are apparently in good health and the ticks have disappeared. Maloney's three cows died; the calf, which, according to Mr. Dresser's statement, was literally covered with the ticks, did not take the disease. A Mr. Munn, of Northfield, living a little west of Dresser's, and on the route the Texas cattle were driven over, lost one cow. This cow was driven to pasture through the street. On careful inquiry, I am satisfied that the above is a full list of the deaths among the cattle in that neighborhood, which there is any reason to attribute to the presence of the Texas cattle.

Hon. Peter Hitchcock, a distinguished citizen of Geauga county, Ohio, has communicated to us the following facts:

* * * * * In Portage county, I think there has been none of the disease except in one township adjoining Summit county, where it was brought by a herd of Illinois steers, and if I am correctly informed, the same cattle that, coming through Summit county, left the disease there.

In this county (Gauga) there has not been a case of the disease. Of this I am very well assured. In Lake county I am quite familiarly acquainted with the cattle men of the county, and I am just as well assured that there have been no cases there, except what happened upon the line of the Lake Shore railroad.

Painesville, upon the railroad, is a point where much the larger proportion of the cattle from the South and West, passing over that railroad, are unloaded, fed and re-shipped; and my impression is that the herd to which you refer, as from Painesville, was really a herd of Western cattle, falsely shipped as from that place, or else a herd that took the disease from an infected yard or car.

In answer to your inquiries, I would state that the "first cases" of which I learned were in Aurora, Summit county, taken, as I understand, from following in the track of the Illinois herd, to which I first referred. The exact date I cannot give, but suppose it was the same as that of the cases of which you were informed by Mr. Reed and the Mayor of Akron.

The disease, so far as I have known, depended upon exposure to grounds over which Texas cattle had been driven recently.

Very respectfully, your obedient servant,

(Signed)

P. HITCHCOCK.

The foregoing extracts from the correspondence are quoted chiefly with the view to convey the information and records therein embodied in the precise words of the respective writers. There was considerable correspondence with the State Commissioners and Assistant Commissioners, and with various persons engaged in handling cattle, but as all the points of information which such correspondence contains are embodied in the report of Dr. Morris,* in this volume, no further mention need be made of it in this place. But there is one point that ought to be mentioned here, namely, that the Board's correspondence has been an important means for imparting information to great numbers who sought it, and also for securing close observation and a reasonable supervision of the disease throughout the country.

During the progress of the infection in the country, there was reason to apprehend that, on the one hand, reasonable fear of the introduction of the disease into healthy herds might lead to embarrassments in the beef supply in the cities; and that on the other hand the drove-men and butchers—true to commercial instinct—might push dying and hopelessly infected beeves upon our city meat markets, as, in fact, Assistant Commissioner Morris ascertained was continually attempted. To prevent or largely control these evils was an incidental and very important object, both kept in view and actually attained in the Board's correspondence. The daily press also discreetly sustained all the sanitary and police measures which the Board recommended, so that entire success was given to the endeavors of the sanitary officers, as regards their advice, as well as their acts. To insert here the entire correspondence, etc., relating to these matters, would needlessly burden this report with details; but we here introduced so much as seemed necessary to show what was the precise nature of the information obtained by us in the correspondence.†

ABSTRACT OF AUTHENTICATED EVIDENCE OBTAINED FROM VARIOUS SOURCES.

The earliest information of which the writer of this report had any information concerning the "Spanish fever," or Texas cattle disease, related to the spread of the disease from the fords of the Osage river some time before the war of the rebellion. The earliest published account of it that has any definiteness and value is embodied in a report upon it by Dr. Albert Badger, of Nevada City, Vernon county, Missouri, and published by the Missouri State Agricultural Society in 1866. From that report we extract the following well stated points:

This disease was first recognized as having been propagated by cattle driven from Texas some twelve or thirteen years ago (that is in 1852 or 1853), the disease having been in this county (Vernon) two seasons previous to its having been traced to Texas cattle.

From the first it was found to be confined to the great roads or highways running through the county from the south, and finally it centered on the Texas cattle in the year 1853, by its being (discovered to be) confined to one highway through the county over which these cattle passed that year. On this road the disease was fatal, killing about fifty per cent of all the cattle along that road, and persons living near the water-courses over which that road crossed lost as high as ninety per cent.

* * * The symptoms of the fever and its fatality are agreed to by every person. The fatality is much greater in a *warm and dry* summer than in a cold and wet one, and the disease always ceases when the frosts and freezing weather have killed the vegetation.

Dr. Badger goes on to give perfectly accurate descriptions of the symptoms of the disease and of the appearance of the sick cattle. His description of two classes of cases, or rather of symptoms and phenomena produced by the blood poisoning

* It is deemed desirable that so far as the disease came under Dr. Morris' official observation, it should be consecutively presented by him. As Assistant Commissioner for the State, he embraced every opportunity personally to see examples of the disease in different localities, and to aid the Board of Health in procuring the most correct information concerning the infected herds in the State of New York.

† Portions of the correspondence that related to strictly scientific inquiries, will be found in the succeeding section of the report.

in the last stage of the disease, is true to the life, and exceedingly instructive. He narrates the circumstances by which the farmers of Vernon county discovered the real source of the infection that entered their herds; also shows conclusively that the disease entirely ceased during the four years of the war, and that the first case of the re-introduction of it occurred in the autumn of 1865, when two pairs of oxen were bought in the south by a Mr. Box, and immediately infected the herds of three of his neighbors.

In June, 1866, a drove of Texas cattle passed through Vernon county, and about eight miles in the adjoining county of Bates, when the citizens resisted their further progress northward, and compelled them to return into the Indian territory by the same road they had entered Vernon county. The disease did not appear for some six weeks, and then it prevailed more mildly than usual, yet it killed about forty per cent of the native herds. It extended directly up to the very point on the roadsides at which the Texans had been turned back, and not a farm beyond that point.

Mr. John H. Tice, a citizen of St. Louis, makes the following statement concerning his early experience of the disease at Cheltenham, near that city :

The first cases I saw were in 1858, five miles west of St. Louis, in a drove of one hundred and eighty head of cattle—three-fourths were Texans and the remainder native stock. In a few days after their arrival the disease broke out among them; the first died on Saturday evening, and by Monday morning there were twelve dead, every one of them being of the native stock. The pasture was isolated, excepting on one side adjoining the turnpike. * * * * *

In 1860 there was a large drove of Texas cattle opposite to the above named pasture, and south of the road. Some of the drove died. The disease soon appeared in the neighborhood cattle, nearly all of them being cows. I lost three cows.

* * * * * About the middle of October, 1866, some derangement occurred in the machinery of a cattle train opposite to my house, and the train was detained somewhere about three hours. On the train were Texas cattle, and as some Irish people employed on the road lived there, and who during the morning and evening pastured their cows within the enclosed railroad, I went and advised them not to let their cows in. One of them did and one did not. The cow let in was a very valuable one, he having paid a short time before eighty dollars for her. In about ten days she sickened with the Texas fever, and died in a few hours. She pastured on the common when taken sick, with the neighborhood cattle. But the day after she died (on the 30th of the month) we had the first killing frost of that season.

During the summers of 1856 and 1857 Texas cattle were brought into the States of Kansas and Iowa in great numbers, and it is stated that the native stock was swept away by a "dry murrain" that prevailed along the trails traversed by the southern droves. The newspapers of those dates, and of 1858, mention the singular circumstance that the course of the disease seemed totally arrested at the banks of any deep stream of water, excepting at the points where the Texas cattle found fording places, at which they crossed. From 1858 to 1861 the disease prevailed along various routes traversed by Texas herds in Missouri, Kansas and Iowa, and in the latter year laws were framed by the Kansas Legislature to regulate the movement of herds from the south. Similar laws were enacted by the Legislatures of Missouri, Illinois and Kentucky, and all of them are based upon the evidence of common observation of the disease introduced and propagated by the presence, or even passing, of cattle from Texas and the Indian territory bordering on Texas.

That this exotic disease wholly ceased in all the States here mentioned during the war of the rebellion is a fact well established; and that it sprang into existence immediately after the war, along the trail of Texas cattle, which again were introduced as soon as the obstruction of military lines had ceased, is a fact equally well established. Even in the famous Blue Grass regions in Central Kentucky the disease made its way in 1866, as the following instructive instance strikingly illustrates: A drover brought a steamboat load of Texas cattle up the Mississippi and Ohio rivers, and, landing them at Louisville, drove on to Lexington, which is in the central part of the State. This drove moved to Georgetown, and wherever the native stock of the districts chanced to graze upon the roadside or pastures that were thus traversed by the Texans, the former were in the course of two months almost entirely swept off by the cattle disease. A drove of fat cattle that chanced

to follow close upon the trail of the Texans were all attacked and all died. A Mrs. Duke, in Georgetown, who had a fine dairy herd, lost forty of her cows in consequence of their temporary exposure to the grounds that had just been traversed by these Texans. These facts are all vouched for by Mr. Benjamin Johnson, of Arcola, Illinois, who brought that herd of Texans into this most healthful and highly cultivated section of Kentucky.

Mr. V. P. Chilton, of southwestern Missouri, has stated to the Commissioners of the Illinois Agricultural Society, that as a resident of that section of country, both before and ever since the Texas cattle began to be driven through it (since 1849), he has observed the following facts: 1. That beyond a doubt, the disease is communicated from feeding or watering with or after Texas cattle. He says:

I have never yet known a case that could not be traced directly to this cause. * * * * * I have had my own cattle separated from large herds of Texas cattle by a fence, without any evil results, and of the immense number that have died on this road, none have died on pastures from which Texas cattle have been excluded. The instances to sustain this view are so numerous that I will not undertake to give them. My opinion is, that the poison is taken into the stomach with their food or water; the greatest danger being in watering in stagnant pools after infected stock, the known habit of cattle when watering, leaving much fetid and feverish matter in the water. In very hot, dry weather it is not safe to let cattle upon ground that has been used by diseased cattle for at least eight weeks after they have been removed, as I have twice known the disease contracted nearly that length of time after they had vacated it, and immediately after hard rains when it was thought that the disease had been swept off by the water, but it was only washed into the water-pools with their droppings, and new energy given to the virus.

This intelligent observer adds:

Cattle that have been here a few months, seldom impart the disease. The fatality in cows appears to be greater than in steers. The disease is much more virulent in some seasons than in others, the excessive heat of this summer (1868) causing it to be worse than usual.

Experience at Cairo. This chief point of transshipment of cattle from steamboats to railroads during the summer of 1867, in consequence of State prohibitions against the movements of Texas cattle over the routes of Kansas, Missouri and Iowa, early became a seat of the Texas plague. The first lots that communicated the disease were landed from Texas, by way of New Orleans, on the 23d day of April, the second on the 26th, and so on, about thirty thousand head having been disembarked at this point during the spring and summer of 1867. The boat loads that first arrived seemed to be in perfect health; but as the hot weather drew on many Texas steers died on the boats and in the Cairo yards. The cattle were allowed two days for rest and recruiting after debarkation from the steamboats before being shipped northward upon the railroads, and it is stated that from twenty-five to thirty cattle died daily in the yards and about the levee during the hot season at Cairo. The farmers in the vicinity of Cairo, suspecting no danger, permitted their native stock to mingle freely with the Texas cattle. But their cows began to perish by the disease early in June, and this fatality continued to increase until it plainly declared the presence of an epizootic. This lesson was not forgotten, for during the past summer of 1868, the farmers very carefully kept their cattle out of the way of all contact and exposure.

Facts Showing the Probable Period of Incubation. These facts appear to consist of two classes: First, the deduction from records of the time from first exposure to the fresh trail of infected Texas cattle, or the time which elapses from the first arrival and presence of the Texas cattle and their excrements to the date of the first outbreak of the disease in native herds; second, the time that may elapse between the first exposure and the first symptoms in native cattle, when that exposure is known to have taken place after the infected grazing grounds or cattle trails had become actually capable of communicating the disease. In other words, there is a distinction to be made between exposure to the infection itself (*i. e.*, the contagium of the disease) and the mere exposure to the Texas cattle directly, or to their trail *immediately* after they passed.

With this preliminary remark, we quote the following facts: 1. At Cairo, in 1867, nearly six weeks elapsed after the landing of the first five hundred Texans before the native cattle began to die by the imported infection; but after the out-

break had declared the presence of the infection, the period that elapsed between the exposure of native stock and the onset of fatal symptoms was scarcely four weeks. 2. At Whitehall, Illinois, Mr. Gregory put two hundred and fifty-five Texas cattle into one of his pastures, in which fourteen native steers were grazing; this was done on the 20th day of June. July 18th, one hundred more Texans were placed in that pasture, and July 29th he put in forty fat natives. Three (3) native cows were also all this while grazing in this pasture with the fourteen native steers, and after a lapse of forty-one days these natives also had the companionship of the forty which arrived on the 29th of July. The following is the record of dates, etc., of the attacks that followed: (a) August 8th, two of the three cows died, the other one having been sent away several days previously. (b) August 10th, one of the fourteen steers died. (c) Five days later, the fat steers that came in on the 29th of July began to die, and these continued to die at the rate of five per day, until forty-four of the fifty-four had died. (d) Five cows, some Texans and a buffalo were placed in a pasturage together on the 20th of June, and on the 8th of August one of these five cows died. (e) July 17th, there were forty-seven native cattle and two hundred and forty Texans placed together in a pasture; they have shown no signs of sickness.

Mr. Groes, a farmer living in Sangamon county, received a drove of cattle on the 16th of June directly from Abilene, Kansas, and placed sixty-two of them in a one hundred acre prairie pasture, where there were thirty-five native cattle grazing. Twenty-six days after receiving the Texas cattle, he removed two of the natives that had fed with them during those three and one-half weeks, and placed them in a fresh pasture where there were no Texans; after twenty-four more days had elapsed, namely, on the 5th of August, the Spanish fever appeared in that herd of thirty-three natives. The two other natives that had been removed were now returned to their companions, and they continued healthy until the end of the season; but in less than ten days after, the disease appeared in that group of thirty-three that had remained longest with the Texans; nineteen of them died.

This case, like that on Mr. Gregory's farm, seems to show that the infectious principle, or *contagium* by which the disease is spread from place to place, either requires,—first, a period of several days, and perhaps as long a period as four weeks, to develop it from the excrement of the Texas cattle as deposited on the ground, to such maturity as to render it sufficiently active to propagate itself; or, second, it requires that the individual cattle which have freshly arrived from the Texas and Indian Territory cattle trails, and whose incubation of the poisonous cause of the disease chances to be yet incomplete, shall continue their incubation of it until it becomes capable of reproducing a crop of its deadly growth. None of the cases thus far quoted serve to determine which of these conditions it is that must explain the curious facts in the instances here mentioned.

The experience upon the great farm of Colonel J. T. Alexander, in Champaign county, Illinois, throws additional light upon the important question which we have here raised. On the last day of May, 1868, four hundred freshly arrived Texans were placed upon his farm at Broadlands, upon a prairie pasture on which one hundred native oxen were grazing. The Texans remained in that pasture only one day. June 7th, two hundred and twenty-six more freshly arrived Texans remained one day in the pasture here mentioned. June 18th, four hundred and ninety-six more of the same kind, freshly arrived, were allowed to remain in the same pasture three days. June 21st, three hundred and forty-nine more arrived and remained one day. June 25th, five hundred and thirty-seven more, by the overland route through Kansas, arrived and were placed in another pasture where twenty-two native cattle were grazing; and on the 30th of June, one hundred more arrived by the same route, and were placed in still another pasture with native cattle. July 26th, disease appeared among native cattle, and during the week it was observed in several different pastures. Now, concerning the one hundred oxen—native cattle—that were grazing in the great pasture which, from the last day of May until the 4th of July, had continued to be a sort of hotel ground for

the grazing and rest of immense herds of freshly arrived Texans day by day, but only for a day or two in each arrival, the following facts appear: First, These one hundred native oxen continued in the great pasture until July 1st, when they were all removed to a pasture in which there had been no Texan herds. Second, That on the 14th of July twenty-seven of these hundred oxen were removed to a pasture that had, for some time, been grazed upon by Texas cattle. Two weeks afterward several of these twenty-seven sickened, and in the course of the month nearly all of them had the Texas cattle disease, and many of them died. In another lot of native cattle, twenty-six in number, which had grazed for twenty days with freshly arrived Texans in a pasture, namely, from June 10th to July 1st, not a case of the disease occurred, the cattle remaining healthy until the end of the season; they were removed from the Texans at the date last mentioned and placed in a pasture where no Texans had grazed. But a numerous herd of the companions of these fortunate twenty-six, that remained in the pasture where they had together grazed with the Texans during the last twenty days of June, and thenceforward for a month continued to graze upon the same pasture alone, before the middle of August were nearly all dead by the disease. These facts are all vouched by Mr. C. L. Eaton, the very intelligent superintendent of the Broadlands farm.

The experience in the Chicago stock yards was peculiarly important. We have already stated many of the facts in our chapter of correspondence, and we will here add a few more statements which seem important in the history of the disease in that neighborhood. Dr. Rauch, the Sanitary Superintendent of Chicago, says:

* * * * * The first case at the Union stock yards, which terminated fatally, occurred July 25th, soon after the arrival of the train that brought the animal there. Two days after, two dead steers were found in a train that arrived from the infected district (Tolono, in Central Illinois), with several animals suffering from the disease. The next day, another train arrived with diseased steers in it. This train was not permitted to remain. On July 29th, a cow died, belonging to a citizen of the Fifth ward.

The number of deaths increased daily until the 20th of August, particularly in the Fifth ward, when they began to diminish. In order that you may understand the history of this plague, I will state that the Fifth ward comprises a large territory, the greater portion of which is unoccupied, and in its primitive state, in the extreme southwestern portion of the city, adjoining the Union stock yards, and where, for the purpose of economy, herds of Texas cattle were grazed at intervals while awaiting sale, from the month of May until the action of the Board prevented it, in August. These animals were also grazed upon the prairie, east, south and west of the stock yards. No herds were at any time permitted to graze east of the Pittsburg and Fort Wayne railroad. * * * On this ground the cows belonging to the Fifth ward grazed, and where the Texas fever prevailed most, and the greatest mortality occurred. A large number of cows grazed east of the Pittsburg and Fort Wayne railroad, but none of them were affected, with the exception of a few which were in the habit of frequenting a spot below the city limits, on the line of the Illinois Central and Michigan Central railroads, connecting with the stock yards, where the cattle cars were cleaned. These cows belonged to citizens of the Fourth ward. Other cases occurred near Calumet Junction, Summit, Lyons, and south and west of the stock yards, where herds of Texas cattle had been driven, or grazed, or where infected native cattle had been sent from the stock yards. One case occurred in the Seventh ward of a cow that had been purchased several days before from a farmer living near Brighton, but which at the time of purchase showed no signs of the disease. As far as we have been able to learn, one hundred and forty-seven milch cows, one heifer and four steers, belonging to citizens of the Fifth ward, died between July 27th and October 10th. At the stock yards thirteen steers died; in the Fourth ward (the extreme southern part of the city and east of the stock yards) ten; and in other parts of Cook county, as far as heard from, ninety-five. Of the animals condemned and killed at the slaughter-houses there were seventy-eight. In these the disease was so well marked that it was unmistakable, while a great many were found in the incipient, and still more in the convalescent, stage, so that the Board did not feel unwarranted in condemning the animals. This was particularly the case with regard to the Texas cattle; six of these were found suffering with the acute symptoms so well marked that they were condemned, making a total of four hundred and one animals that died of this disease and were slaughtered within the limits of Cook county.

The following observation concerning an important symptom was made by Dr. Rauch:

So far no notice in the description of the symptoms of this disease has been taken of the chill by which it is ushered in, nor the urination. With regard to the first symptom, I would state that

three cases fell under my observation in which this was well marked; and I have no doubt but that such was the case in nearly all the animals that suffered. * * *

With regard to the transmittal of this disease by native to native cattle I must confess that, notwithstanding the weight of testimony against it, I am inclined to believe that such can and does take place. I can see no good reason why such should not be the case. * * * Several instances of this character fell under my observation during the past three months, but the most conclusive evidence I have is, that native cattle were purchased at Chicago in August, and taken to Lebanon county, Pennsylvania, and that a short time after they died, and that other native cattle on the same farm and neighborhood died, and that no Texas cattle had been near the place.

Mr. Hill, of Tolono, a little town in Illinois, where large numbers of the Texas cattle arrived from Cairo and from the railroad depot, stated the following facts concerning the experience in which he had participated as a citizen of the place. He says:

Our little town is situated at the crossing of the Great Western and the Chicago branch of the Illinois Central railroad. Great preparations were made there last spring by the Illinois Central railroad, and many thousand dollars expended in building fine cattle pens and barns, which, although the road denied it, we supposed were intended (as the fact turned out to be) for the purpose of facilitating the importation of these Texan cattle. The first train containing any arrived on the 29th of last April, and they continued to come until late in the summer. About the 10th of June the cattle disease broke out, and continued to rage as long as there was material for it to work upon, until nearly all of our cattle fell a prey to it. Among the few left the disease still continues to work, one gentleman having lost some fine steers only last week. On the 5th day of September, within a radius of two miles of the town, I think there were *but two milk cows left*, and up to that time seven hundred and twenty-six cattle had died in that little township, which polls but a trifle over two hundred votes, since which time two hundred more have died.

Concerning the isolation or quarantine of herds as a means of arresting the spread of the disease, Mr. Hill states the following facts:

Some facts have been stated in regard to Mr. Larmon's cattle, and the disease not being communicated to them across a fence. As I am a near neighbor of his I will just state what I know about that. His cows were among the last that died; but they did die notwithstanding that they were enlosed, I think, by a common five-plank fence.

The district around Tolono having been so thoroughly infected that only two of the native cows remained alive after the 1st of October, it does not appear strange that this pasture of Mr. Larmon should have become infected at last. Mr. Hill does not inform us in what manner the water drains into or from Mr. Larmon's pasture, and there are several instances known to us in which pastures and yards which were receiving the water shed of infected grounds and Texas cattle beyond their enclosure, and in that manner apparently became infected in turn, yet had not been actually visited or trodden by any Texas herds or other sick cattle before the disease sprang up among the native cattle, in the manner which Mr. Hill has well described in Mr. Larmon's case.

Mr. Hill, whose testimony seems to us peculiarly straightforward and logical, has recently given an account of the prevalence of this Texan epizootic among the horses of the same district in which the cattle had been swept away before the horses began to die. He regards it as the same disease. He gives the following important evidence upon the two questions: (1.) Does the *contagium* of the Texas cattle disease persist in its activity long after the cattle have been destroyed by it in the pastures? (2.) What is the period of incubation in pastures that have become infected by this *contagium* in its full destructive force or more mature stage of development?

* (1.) *Answer.* After our cows had all died out, some eight or ten were brought from Edgar county. They had never been exposed to the Texan cattle ranges or trails, excepting as it was necessary for them to cross where Texas cattle had been driven. They were sold in our place, and part of them have died. * * *

(2.) Besides these cows a large herd of native cattle, that had not been in any manner exposed to the Texans, were brought into the town and pastured upon the same grounds where the disease had prevailed so fatally. In about three weeks they began to die, and continued to die until nearly all were dead. One farmer alone lost seventy previous to the first of November.

Mr. Moore, of Missouri, states the following interesting facts concerning the destruction of native stock taken southward to the borders of Texas, overland.

His testimony is corroborated by an abundance of testimony of the same kind which has come into our possession:

Some freighters, about to cross the plains, selected native and Texas cattle, herded them and fed them together during the winter; made up their teams in the spring, and started across the plains, with all their animals apparently well. When they got half way across the plains, the native cattle were all dead, and the Texas cattle were left to make the journey alone. These are the facts communicated to me by a gentleman who was with the train, and knew all about it.

There is abundant testimony to the fact that Northern stock, particularly that which is well bred, seldom survives the acclimating disease which they suffer upon being taken southward beyond the Arkansas and Osage rivers. But the nature of the acclimatizing disease is not yet well known to us. The Agricultural Bureau of the general government, at Washington, collected important information upon this subject nearly ten years ago. (See Reports of the Agricultural Bureau, Department of the Interior, 1860.)

THE "TICK" THEORY CONCERNING THE DISEASE.

As some of the largest losers of cattle by the disease in the West came to the conclusion that the vermin known as "wood-ticks," which infested the skin of nearly all the newly arrived Texas cattle, were in some way the cause of the infection to native herds, we requested a friend who had examined into the history of the disease of the "tick," in Summit county, Ohio, to communicate the results of his investigation. The facts are simply these: The doctor and the farmer believed without evidence, simply in view of the fact that the "tick" seemed universally present with the infected herds, that the vermin served in some way as the cause and carrier of the disease. Our correspondent, M. C. Read, Esq., of Hudson, Ohio, forwarded to us specimens of the "ticks," and called attention to the following description of them by Cuivier:

Ixodes reticulatus (Lat., Fab.); ash colored, with small spots and small annular lines of a reddish brown; edges of the abdomen striated; pulpy; almost oval. It attaches itself to oxen and is, when swollen up, five or six lines in length.

Texas cattle usually become extensively covered with these "wood-ticks" before leaving their native grazing grounds, and when they arrive at the North, during the early part of summer, they bring myriads of these vermin upon their skins. The cattle, as we are informed by Mr. Read, and several other correspondents, have never been observed to make any attempt to remove these vermin off their hides by teeth or tongue. And we need only quote the statement made, concerning this species of ixodes, by B. D. Walsh, Esq., of Rock Island, Illinois, one of the most learned entomologists in our country:

There is a prevailing opinion among certain classes, that the ticks which are found on the cattle which die of Texas fever, are actually the cause of the disease. In view of this fact, specimens of these ticks have been sent us for examination, from different localities in Illinois, and they are identical with those we have ourselves examined upon diseased cattle in St. Louis, and are but the common cattle tick. It is exceedingly improbable that they have any thing to do with the disease, although it is barely possible that they may communicate the infection from the Texas cattle to our native herds. (See *American Entomologist*, Vol. I, No. 2, St. Louis, October, 1868.)

IV.

OBJECTS OF SCIENTIFIC INVESTIGATION, AND DESCRIPTION OF METHODS ADOPTED.

Plainly enough there are two leading and co-equal objects which demand that thorough investigations shall be made concerning whatever pestilential disease occurs in the animals that are used for human food. The first object relates to the ascertaining of the nature and effects of the special disease in the sick animal, with reference to the results to be feared or anticipated when their flesh is used for food; and the second object of investigation has reference to the discovery of the hidden and preventable causes of the pestilential diseases which afflict animal life, and with an ultimate and very special reference to the use of such knowledge in unfolding the natural laws of epidemics, and the practical principles of hygiene.

First object of inquiry—The Diseased Food Question. That animals dying or killed when suffering from a pestilential and destructive disease, or when slowly undergoing the incubative effects of an infectious poison or ferment that at the full term of the incubation shall destroy life, would thereby be rendered unfit for human food, might seem to be decided, without argument, in the affirmative. But common observation has shown that not every kind of disease of the lower animals is noticeably pernicious as food when the flesh is cooked; and as the beneficent laws of our physical organization do actually provide in some degree for the protection of human life against many of the perils of defective foods, it has come to pass that the empirical conclusion has been drawn very boldly, that no cooked meats, however much the animals whence the meats were obtained may have been diseased, will produce disease or sickness. But this is a preposterous doctrine, and it is as absolutely untrue as it is illogical.

This report is not the proper place for examining into the whole subject of diseased foods, so we will simply state the questions that had to be considered by the Committee of the Board of Health in regard to the matter.

1. In consequence of an enormous increase in the death-rate by diarrhoeal diseases, and especially in view of the fact that a sudden and utterly obstinate and incurable class of choleraic diarrhoeas in adults, and in children past the age and diet of infancy, had very rapidly increased during the last weeks in July and the first weeks of August, in New York, we repeat what we have previously stated, that the chief incentive to our first search for the presence and characteristics of the "Texas cattle disease," had special reference to the well formed purpose to arrest, discover and control whatever removable causes of disease could then be found operating upon the population of the metropolis. During the first ten days of August, the Registrar personally visited twenty-five sick, dying or dead persons, to discover what local and domestic causes of choleraic disease might be present in the places where such sickness was occurring. At no hour of the night was he free from this duty of visiting cases of sudden sickness of this kind. Familiar as he was with Asiatic cholera and all forms of summer cholera, he found ample reasons for doubting if all the causes of this class of choleraic diarrhoeas then prevalent, were adequately known and controlled. The precise state of our anxieties and of the general estimation of removable causes of some of the diarrhoeal disease at the end of the first week of August, is correctly set forth in the note which accompanied the mortality records for the week ending August 8th, as usually submitted to the Board of Health. We quote a paragraph to show how medical officers regard the duty of searching for and restraining the sources of such excesses of diarrhoeal diseases:

* * * * * There were 751 deaths in New York last week, and 267 in Brooklyn, against 730 and 233 in the respective cities the previous week. * * * Acute diarrhoeal diseases are charged with 203 deaths in New York (40.34 per cent of the total mortality), and with 142 (53.18 per cent of the total) in Brooklyn. We regret to see that the fatality of this most preventable kind of disease, the unerring indicator of foulness and putrescence in domestic surroundings or in food articles, continues to increase, and there is just reason for saying that impure and injurious food has been sold in the markets of New York and Brooklyn. * * * And the fact must fearlessly be told that it is

a crime against life to offer for food any portion of the flesh of the sick and infected animals that may for several weeks continue to be sent forward from the West. It is idle to talk of such meats being safe and wholesome for food. Medical officers are in duty bound to know the truth on this subject, and to advise accordingly.

Such was—and we believe such should be—the view taken of the use of the flesh of diseased or infected animals for food, especially when, by the symptoms of the sickness, the disorder is pestilential. How urgently important is this view of the case, when there is a deadly prevalence of bowel disorders in the community? And as sundry correspondents in newspapers, and some persons of fair authority in veterinary science, have expressed the opinion that the flesh of diseased cattle is harmless, it is but proper that we should quote here a paragraph from a letter of information which we received from Prof. John Gamgee, the distinguished veterinarian, who is at present in this country, then writing from Kansas city, Missouri, under date of August 22d, after having examined scores of the dead and dying cattle, and having discovered the same disease in Texas cattle that were awaiting transportation from Kansas. That gentleman remarked that “no sanitary officer can, for a moment, sanction the sale of the meat of diseased animals, whatever the disease for which they are slaughtered.”

As medical men and sanitary officers, we do not feel at liberty to pass lightly over the questions that are involved in the consideration of this first object of scientific inquiry and sanitary regulation, in regard to the foods derived from sick and infected animals. But as we cannot, in this brief report, properly take up the several questions that relate to this important subject, the following statement of the main points in the argument against the use of diseased animal food is submitted:

First. The origin and early stages of various disorders of human health, especially of those affecting the healthy condition of the blood and secretions, and the digestive and the depurative functions, and also certain degenerations of vital organs and proximate elements of the human body, are very reasonably believed to be often dependent upon faulty food and consequent faulty assimilation; and as the peculiar manner in which the flesh of diseased animals sometimes operates as a virulent cause of fatal blood-changes, warrants the conclusion that such food, even when cooked, produces its deleterious effects by operating as a morbid poison or ferment (*zyme*), every medical officer is in duty bound to discriminate rigidly against those special diseases of animals that destroy by means of pestilential disintegration or zymotic transformations in the blood and fluids of the diseased creatures. The entire class of anthrax fevers or anthracoid diseases, and all those diseases that are known by the term “braxy,” are to be regarded as *liable*, though *not certain* in all cases, to beget disease of a fatal kind in man or beast, if used for food. Testimony on this subject is clear and strong.

That the disease we have just mentioned, as well as the rinderpest, the contagious pleuro-pneumonia, and the bovine-typhus, and all the disorders which the Germans term *milzbrand*, should not, in a majority of instances in which the diseased flesh is used as food, actually produce fatal results or any recognized disease in the persons who partake of the food, is neither strange nor important in this argument. Not every child takes scarlatina or the small-pox when exposed to the contagia of those diseases; and, on the other hand, not every human stomach will destroy, and not every human body will certainly and completely eliminate, all noxious elements from the circulating blood. So, also, in and upon some persons parasites will grow and propagate, while other persons will resist such depressing maladies.

In regard to our earlier opinions concerning the essential nature of the Texas cattle disease, we should here mention that until it was discovered that a cryptogamic organism was constantly to be found in the blood and bile of the infected animals, we believed that the malady would be found closely allied to the anthracoid and braxy diseases described by European pathologists. The cryptogamic and contingently infectious nature which we now know that the malady possesses, enhances the theoretical importance of restrictions against the use of such flesh for

food. And, in regard to the whole subject, nothing could be said more appropriately than has been said by the learned and most practical of hygienists and pathologists, Prof. Edward A. Parkes, in the following remark:

We should conclude from general principles that all diseases must affect the composition of flesh, and as the composition of our own bodies is inextricably blended with the composition of the substances we eat, it must be of the greatest importance to health to have these substances as pure as possible.*

In his fifth and seventh annual reports to the Privy Council of England, the chief medical officer, Dr. John Simon, takes up this question with a masterly grasp, and he arrives at the same general conclusions as that which Prof. Parkes has so well expressed. In the light of experience and the most advanced knowledge, therefore, the terms in which the decision of the Metropolitan Board of Health was set forth by its special committee on the 13th of August will stand as a safe and good rule.†

The Second Object sought in the Investigations—Search for the Causes of the Epizootic Malady with reference to the Laws of Epidemics. The skillful study of epizootics, especially those which affect the bovine species in open pastures, and in their removals or migrations from their native ranges of grazing, etc., has in the past half century added much important information to the stock of medical knowledge concerning the causes of certain endemic diseases, and concerning various important questions in the pathology of such maladies. The human family has for seventy years been enjoying—as a direct result of Dr. Jenner's skillful and scientific study of a bovine disease—the greatest boon that medical inquiry has ever conferred upon man. The modern investigations concerning the "murrains," have finally classified them into groups of maladies that are almost entirely analogous to the most destructive epidemic and infectious diseases of the human family; and the scientific medical study of each group of them and of the outbreaks of them during the last fifteen or twenty years, has greatly aided the progress of a kind of practical knowledge that is much needed.

But, until the scientific commission which was appointed to investigate the rinderpest in England had completed their reports, there had but little been published in the English language that was adapted to aid sanitary officers in meeting the exigencies of an outbreak of a destructive epizootic affecting the meat supply

* *Practical Hygiene*, by E. A. Parkes, p. 161.

† METROPOLITAN BOARD OF HEALTH, }
NEW YORK, August 13th, 1868. }

In view of the rapid spread of the malignant disease that has burst forth among herds of cattle in certain portions of Illinois and Indiana, whence beef is supplied to the Metropolitan District of New York, and the most populous portions of the Eastern and Middle States, this Board of Health has endeavored promptly to do whatever lies in its power to prevent the introduction of such cattle, and to exclude all such beef from the markets in this district. And however greatly it is regretted that farmers and holders of the infected and sickly herds must suffer personal losses and inconvenience, the act of bringing forward and offering any such animals for food must be regarded as a very gross offense against the lives of our fellow beings. The investigations made by scientific and experienced officers of this Board have fully confirmed the opinion that the flesh of those diseased animals cannot safely be used for food. The information now before us clearly shows that until some proof of the contrary is obtained, the malignant disease which has been brought eastward from Illinois and Indiana should be regarded and treated as an infective fever or plague. The transportation of any sick or infected cattle from the sickly districts to other States should be prohibited. The offering of any such diseased animals, or any portion of their flesh for sale for food within the Metropolitan District of New York, will be regarded as a culpable offense against the sanitary ordinances relating to markets and food articles, and will be punished with the heaviest penalties the laws provide. No relaxation of this order of the Board can be allowed.

From the first hour that any officer of this Board had any information of the probable presence or approach of the affected herds near to New York, the utmost vigilance has been resorted to for the prompt and absolute exclusion of these cattle and every portion of their flesh from the markets. The greatest diligence and all available means are being employed in the investigations of the pathology and character of the disease, and its morbid results in the organs and flesh of the sick cattle.

of cities. The elaborate and thoroughly practical presentation of the whole subject of diseased meat supplies, however, had previously been made, as just mentioned, by the chief medical officer to the English Privy Council; and that presentation was made solely upon the ground of the particular necessity for carefully guarding our markets and the peoples' tables against diseased meat supplies.

Epizootic diseases, when of a pestilential or destructive character, usually make their outbreaks with great violence and rapidity of movement. And, as we are informed, there never has been an instance until the present year—except under an imperial government occasionally, as in France in 1865-6—in which an infectious epizootic among beef cattle has been confronted from the first day of discovering its presence, and, so far as human ability and effort are concerned, held under absolute police control. The fact that this Texas cattle fever did not turn out to be so inevitably contagious, as there was reason to expect and fear it might, did not diminish the duty of promptitude of official action. Indeed, it has resulted that this mode of action was essentially requisite as a means of investigating the disease with accuracy and success. This remark brings us to the postulate that should be laid down as the first rule to be established in attempting to exercise a sanitary control over, or to make an accurate and scientific investigation of, any infectious and pestilential disease of cattle, sheep or swine that are designed for human food. It is as follows: Place every diseased animal in quarantine, and have all suspected animals under strict observation and under sanitary regulations wherever they are moved or kept.

Hitherto, or especially until the European States brought the rinderpest under scientific investigation and strict police control, there has been much difficulty in pursuing medical observations upon the pestilential diseases of cattle. On the one hand, it has been difficult—in the United States scarcely possible—for medical officers of health to pursue any adequate study of a bovine epizootic. And, on the other hand, the descriptions and the pathological inquiries concerning epizootic maladies were generally vague and unscientific.

The fact was known to us that there was such a malady as the "Texas cattle disease," or "Spanish fever," but no medical or scientific account of it had ever been published. It was also obscurely known that when improved northern stocks of cattle (and horses also) are taken into the regions of the Gulf of Mexico they suffer an enormous death-rate from some unknown and undescribed disease. This obscure kind of knowledge had, for the past ten or twelve years, been so vaguely reported that really nothing was known of its medical history. The writer now recalls with much interest certain efforts he made—when passing from St. Louis to New Orleans, in the summer of 1865, in company with two gentlemen from the western border of Missouri and Arkansas—to ascertain what were the geographical limits of the "Texas cattle disease," or "Spanish fever," of which some indefinite kind of information had been received before the war. But the war had suspended the disease, and it was only remembered as a "dry murrain" that destroyed native cattle herds at the fords of the Osage river. The information that during the last few months had reached us, concerning the earlier observations of this disease, proves that it had for many years been vaguely known and described by the great drovers of cattle in the southwest. We here allude to these facts for the purpose of showing that it was not possible at the time when we first saw the disease to refer to any published account concerning it that could in the least aid the sanitary authorities in the duties which they owed to the public, in regard to measures that might need to be taken concerning the infected cattle. The chief objects and methods for scientific investigations by the Board's officers had to be determined upon from the stand-point at which the diseased cattle were first viewed in the market yards near New York last August.

THE OBJECTS AND METHODS OF THE SCIENTIFIC INQUIRY.

Having reason to believe that this disease was allied to the anthracoid maladies, or to some specific and infectious pestilence, which, by exact methods of investiga-

tion, might be as perfectly understood as any great types of disease can be, and believing, also, that whatever we might clearly demonstrate in regard to the origin, spread, and morbid changes, or pathology of this cattle fever would directly promote the knowledge of causation, and the means of preventing epidemic as well as epizootic diseases, we adopted impromptu the methods of inquiry that are indicated by the present advanced state of medical and sanitary science. These comprised:

1. The medical observations of symptoms.
2. The slaughter and post-mortem examination of infected cattle with special reference to investigation concerning the disease.
3. The continual use of the microscope in the pathological researches.
4. The employment of chemical analyses and tests.
5. Experiments to test the supposed methods by which the disease may be communicated.
6. Experiments and tests for the verification or settlement of questions arising in the progress of investigations.

With this simple plan of procedure it was easy to keep up systematic inquiries. And it has turned out, in our experience, that this methodical organization of the means for investigation has proved to be an essential aid to the work.

The objects that most urgently invited the diligent investigation by these and other kinds of inquiry concerning the nature of the disease, after the food question had received adequate care, are objects toward which the desires and highest endeavors of physicians and hygienists may justly be directed; for, they relate to the larger and more exact comprehension of the physical circumstances and laws that are concerned in the cause and spread of pestilential diseases.

Here was a bovine pestilence that appeared to infect nearly all the cattle that grazed over the trail of freshly arrived Texas herds, and which destroys eighty per cent of all the Northern cattle that have become obviously infected. And yet, notwithstanding this fatality of the unseen contagium, the contagiousness itself is subject to such contingencies and exceptions, that it the more strongly promised to aid in unveiling very important truths relating to the origin and propagation of certain pestilences that afflict the human family within limited districts. Yellow fever, cholera and typhoid fever variously represent the kinds of contagia and classes of yet undiscovered material causes which need, if possible, to be individually described, so that the hygienic control of them may be more definite and absolute. And, as regards a remarkable association of analogies that we have found to exist between the Texas cattle disease and the yellow fever, as witnessed in the human family, it may be remarked that we are now fully warranted in adopting the expression used by Dr. Stiles in his report, that the "Texas cattle disease, when judged by its pathological lesions, might be termed the yellow fever of cattle." A detailed account of these analogies need not be presented here, but it suffices to state that the points in comparison in these two pestilences are so well marked, as to warrant the belief that the actual demonstration of the precise nature, origin, propagation and pathological effects of the infective principle or virus of either of these two pestilences, would throw such a flood of light upon that of the other as to enable medical men soon to grasp and unfold the hitherto mysterious laws that govern the propagation of yellow fever. Let it be understood, however, that we do not presume that these two pestilences are *identical*; we simply assert, that they are wonderfully analogous in essential and constant attributes in their pathology, and in certain chief points, but not in all, of the phenomena and habits of their respective principles or agents of infectiveness.

Upon this subject the leading medical philosophers and hygienists of our day have for some years past been urging the necessity and duty of making careful and thorough scientific investigations in regard to the infectious maladies which afflict cattle, sheep and other domestic animals. It requires no argument to show that both the labor and facilities, as well as the satisfaction, in making exact observations upon tame animals that are wholly under the control of the medical observer and subject in all respects to his absolute authority, even to any kind of

experimentation (experiments that are, of course, *not cruel or barbarous*), and subject, at the observer's arbitrary decision—to slaughter and to the instant examination of the blood and the tissue while they are absolutely fresh—are conducive to the attainment of exact and trustworthy results, and to the discovery of the more important and recondite physical relations that most need to be understood in the history of infectious and epidemic or endemic diseases.

Epizootics, thoroughly investigated in the light of modern science, can become, and indeed are becoming, the most trustworthy aids to the correct interpretation of the conditions and principles connected with the propagation and the pathological history of pestilential epidemics. The time has come when the medical profession is demanding that the value of this kind of investigation into the pestilential maladies of the domesticated lower animals shall be more intelligently appreciated by all educated physicians who have opportunity for observing epizootics. And we deem it due to the medical profession to state in this place that not a few of its most learned and practical members are at present pursuing this kind of study in various parts of Europe, and that for several years past the profound sanitary scholar and statesmanlike medical officer of the English Privy Council, John Simon, Esq., has continued to direct various investigations of this kind in the interests of the public health in Great Britain. In those inquiries the name of Professor Gamgee and the distinguished Dr. Thudichum have become associated with that of Dr. Simon. Dr. Lethby—the chief medical officer of health for London—and Dr. Henry Ballard, the medical officer of Islington (a district of London famous for stables and fevers), have done much to advance this kind of investigation. In connection with the English Cattle Plague Commission we find that the chief value of all their royal reports consists in the results of scientific investigations by Dr. Charles Murcheson, Dr. J. Burdon Sanderson, Dr. W. Marcet, Dr. J. S. Britton, Dr. Lionel S. Beale and Dr. Angus Smith; while the Edinburgh committee for the same investigation consisted of such physicians as Dr. Littlejohn, the chief medical officer of Edinburgh, Sir James Y. Simpson, Dr. Lyon Playfair and Dr. Andrew Wood. These distinguished names represent the highest renown and scientific ability of the medical profession in Great Britain. In this list of the promoters of the kind of inquiry here referred to, we find the names of Sir Henry Holland and Dr. Wm. Budd. The Royal Academy of Medicine in Belgium has for years made it a point of duty to promote this kind of scientific investigation; and throughout Europe this class of inquiries is regarded as eminently dutiful by medical men and by governments. But to the Metropolitan Board of Health and Cattle Plague Commissioners it is not necessary to mention this testimony to the correctness of the principles on which they have acted in their official efforts to procure a suitable investigation of the Texas cattle disease. The subject is here referred to in this way for the purpose of promoting this kind of practical inquiry into the nature, causes and means of preventing both epizootic and epidemic diseases. If there are among us any persons within the ranks of the medical profession or in public life who would affect to disdain such labors by medical or scientific men, it would be a waste of time to offer evidence to them in support of the course pursued by the Board of Health and the State Commissioners.

But to return to the ground upon which the lines of progress in the needed advancement in medical and sanitary knowledge are now marked out, it is deemed desirable that the medical officers and members of the Board should put forth reasonable endeavors to promote the advancement of these topics of inquiry. The committee and the medical officers of health in various cities, with whom we are now in correspondence, throughout the United States and Europe entertain the same opinion upon this subject, which has been well expressed by Dr. William Budd, of England, in his admirable sketches of the epidemic variola ovina, or small-pox of sheep. That greatly honored physician and hygienist, in the annual address which he delivered by appointment before the British Medical Association, set forth the views of the enlightened portion of the medical profession as follows:

Statistics afford much information on epidemics; but it is all of a general kind. The really vital questions they leave almost untouched. Neither on the mode of being of the morbid agent without the body, nor of its mode of action, do they throw any but a dim and distant light. * * * *What we want is some clue, however slender, to guide us through the obscurity in which the truth lies hid.* Now, exactly such a clue is found in that most remarkable of properties, the power which certain epidemic disorders possess of spreading by contagion. * * * If we were asked to define what other conditions we should desire * * * it would be that all the sufferers should be under our own eye, that their incomings and outgoings and intercourse with one another should all be known to us; or, better still, should be determined by our own will. It will be seen at once that, taken together, these conditions are not to be met with in human life. They are only to be found in the case of the domestic animals.

* * * * *
 What in the whole range of medicine is so striking as this invasion of the yet living and unbroken frame by a power, which, like an evil spirit of the olden time, unseen, untraceable, and unbidden, enters in and takes possession, and holds riot and revel there, to issue forth again reinforced by a countless progeny? What so wonderful as this *imperium in imperio*, in which the majestic spirit that animates the human form is dethroned, and the noble form itself is often marred and laid in the dust by a thing in comparison with which mildew and toadstool stand high in the scale of being.*

These are the thoughts of no ordinary physician, but of one of the greatest promoters of hygiene that ever lived; and these words were spoken to the chief leaders of medical and sanitary science and practice in England. In their endeavor to grasp the causes and the secret operations of human diseases, especially those of an epidemic and infectious type, physicians and hygienists are continually thwarted or hindered by the various circumstances which are peculiar to the social, moral and physical conditions that are characteristic of man, and of the very organization of society. For when we would undertake any exact demonstrations regarding the incubation or the exclusive operation of any contagium or infection in man, there arises the necessity and the difficulty of an arbitrary control of all the movements of the persons who become the subjects of such investigation. And then, even under imprisonment, the human being is sure to interfere in some way with the plans and details of the medical observations. So, likewise, the most favorable and essential physical circumstances for insuring correctness and completeness in the investigation of the anatomical and pathological changes that constitute or cause disease, especially in maladies of the infectious and epidemic types, the *post-mortem examination* is necessarily delayed in obedience to the sentiment of proper respect for the dead and for the grief of the friends; and in cases of convalescence, or partial recovery, or, on the other hand, of lingering suffering and the slow approach to the fatal end, the way is necessarily barred against the discovery of the most essential facts that need to be understood by the physician and pathologist; the very sentiments and sanctions of our moral nature forbid that we should so mar the human body, or proceed upon any investigations upon or with it as in any manner would disturb the living occupant, or in any manner offend the sentiments of the living friends after death shall have left to scientific investigators the human body slain by the disease that is the subject of the desired inquiry.

But, in addition to all these obstructions to the prompt and exact researches in the pathology of diseases of the infectious and epidemic kinds, there is an insurmountable difficulty in regard to the exigencies, perils and alarms which always attend upon such maladies in the human family, when the claims of the sick and the dying demand the utmost sacrifices of the physician's time and thoughts, and when, alas, the healer and student fall victims to the fatal infection of the malady which demands such sacrifices for science and its humane purposes. This view of the subject in question would seem to need no special illustrations beyond this mere statement of the case; but if any one chances to regard this as an over-statement of the case let him revert to the experience of medical men in any great epi-

* *Varicella Orina, Sheep's Small-pox, or Laws of Epidemics, illustrated by an experimental type.* Being the annual address before the British Medical Association, 1863. By William Budd, M. D., Hon. and Consulting Physician to the Royal Infirmary, Bristol.

demic, even when not personally contagious, as in the visitations of yellow fever, a pestilence that, like cholera, calls urgently for the most searching investigations. Even upon the inviting and airy grounds of the Quarantine establishment, in successive years, the present Registrar of the Metropolitan Board of Health, then in charge of the Quarantine hospitals, found that out of the great number of scientific physicians whom he invited to witness the phenomena and pathological effects of yellow fever, only two ventured to approach the hospital wards or enter the dead house.

The remark has justly been made by our excellent pathologist and microscopist, Dr. Stiles, in his special report, that the Texas cattle disease may properly be termed *yellow fever in cattle*. And, although it is not claimed that the cause of the Texas cattle disease and the mysterious contagium of the yellow fever in man are one and the same, yet it is a fact full of practical importance and significance that this disease of cattle is the only one yet discovered and examined in the animal kingdom which produces identically the same pathological changes and all the essential phenomena that are found to characterize yellow fever in man. The writer speaks from very extensive observation and researches in each of these diseases when he states that the remark made by Dr. Stiles is, in his judgment, fully sustained by the constant attributes of both the diseases, and that it now seems probable that the medical profession will ultimately arrive at an exact and controlling knowledge of the great scourge of our American tropics and littoral regions by pursuing the same course of investigation in regard to it that we have pursued in regard to the Texas cattle disease; and it is not altogether improbable that the very lines of researches which have now been commenced so successfully in regard to the cattle disease may lead directly to the much desired discovery of the essential nature, operation, cause and external sources of yellow fever. The medical officer to whom the supervision of all these researches was committed, confessed at an early stage of the work, even before the end of August, the wonderful analogies which he and Dr. Stiles observed to exist between these two diseases as respects changes, tissues and fluids of the victims, as well as in regard to some points connected with the incubation and effects of the infectious cause; so that the hope of being guided by this bovine pestilence back through its own natural history, and upward to a true knowledge of the exact sources and the nature of yellow fever and some other destructive pestilences, should inspire untiring endeavors to reach general results that will permanently benefit mankind after this new disease of cattle may have become extinct under improved sanitary care in the herding and handling of western and southern stock. The very direct bearing which this kind of investigation is to have upon sanitary measures against the worst pestilences that have, until the present hour, continued to afflict the human family will ere long be well understood. Then will these labors which the Metropolitan Board of Health authorized its medical officers to undertake be fully appreciated.

THE MEDICAL OBSERVATION OF THE SYMPTOMS IN THE TEXAS CATTLE DISEASE.

The minute observation of symptoms in wild and restless bullocks that chiefly suffered the disease was a difficult and some times an impossible task. We have requested Dr. Morris to incorporate into his special report all the tabulated records which the committee has been able to make upon this subject. It will be seen by Dr. Morris' report that the symptoms cover a diversity of facts, the chief of which relate to the temperature, condition of the respiration and the respiratory organs, the pulse and the excremental performances, especially the hæmaturia or "black water." The leading facts regarding the symptoms that deserved most attention from the medical observer are these, viz.:

1. A great increase of temperature, which is invariably noticeable at the earliest moment of *obvious* disease. Though no opportunity was afforded this committee or Assistant Commissioner Dr. Morris to make observations for four or five days previously to the commencement of the obvious symptoms in any infected bullock, there was no instance in which an observation of increased temperature amounting

to $3\frac{1}{2}^{\circ}$ above the natural heat of healthy bullocks—that standard being 100° Fah., or a fraction of a degree below 100—was not followed within four days by the unequivocal evidences of the cattle disease. The first observations upon this point were commenced on the 8th and 9th of August, in Mr. Alexander's infected herd at Communipaw, and on the 11th and 12th, temperature observations were made upon five of the cattle that exhibited symptoms of the disease in Mr. Thomas' herd at Bergen, with the following result: The one least sick in appearance had a temperature of 104° , while one that was staggering and delirious with the disease had a temperature of 109° ; another, delirious but not staggering, $107\frac{1}{2}^{\circ}$; another, $107\frac{1}{2}^{\circ}$; and another, very feeble, 105° . * On the 13th of August the animal that was delirious and staggering twenty-four hours previously, and now unable to walk, had a temperature of 106° in the rectum, and $106\frac{1}{2}^{\circ}$ in the blood of the aorta at the moment of slaughter. The other bullock that had a temperature of $107\frac{1}{2}^{\circ}$ was found in a dying condition on the 13th, and had, a moment before slaughter, a temperature of 107° in the rectum, and $107\frac{1}{2}^{\circ}$ in the blood of the aorta at the time of slaughter; while the bullock which on the 12th had a temperature of 105° was found to be in a dying condition, and had a temperature of 106° in the rectum and the blood of the aorta at the moment the vessels of its neck were severed.

Persons who did not witness the disease might reasonably inquire if this feverish temperature was not the result of inflammatory action or excessive irritation incident to the hardships of transportation; and this was a question which the committee caused to be thoroughly investigated with reference to cattle that were arriving under the circumstances, and at the same time obtained in reference to the sick herds. It was proved that the temperature of all cattle, excepting the victims of this infection, gave evidence of but slight increase of temperature under any circumstances, and that an increase above 103° Fahrenheit was not observed in any other than infected bullocks, and that there were only three or four instances in which the uninfected animals steadily exhibited a temperature above 101° . The average of all the temperature observations taken of the infected bullocks was nearly 105° . The mean temperature of the central part of the liver, taken from ten to fifteen minutes after the animal ceased to breathe, was $104\frac{1}{2}^{\circ}$.*

2. Evidences of toxæmia were early observed to be among the very first symptoms of the obvious stage of the disease—constant unrest, a faltering gait, a partial paralysis, occasionally a kind of paraplegia; the sick animal in such cases reeling or actually falling down upon its hind quarters, and in some instances the urinary bladder remains distended and almost continually leaking, as by a kind of enuresis—the symptoms, in short, being those which pertain to failure of innervation in consequence of some kind of poisoning, or from some fatal change in the condition and chemistry of the blood. But chief among this group of symptoms is the disturbance of the senses and the occurrence of a kind of delirium.

Further details of this class of symptoms need not be mentioned here. The evidence of the operation of a morbid poison is the subject to which attention is invited; and whether this poison be derived from an external source, as some kind of contagious matter for example, or some parasite, or whether it chances to be a production of morbid changes in the proximate elements of the circulating blood, the fact that such a condition of empoisonment occurs is important and suggestive.

3. The evidence of dissolution of the proximate elements of the blood appeared in a special group of symptoms as well as in certain general phenomena. The "black water," or hæmaturia, is the constant symptom of the breaking up of the blood globules, while the marvelous increase of temperature in the infected animal, the ecchymoses and engorgement of nearly all vascular organs and tissues, such as appeared in nearly all the cattle that died or were condemned, must be regarded as

*The practical utility of thermometrical observations has been strikingly illustrated in the dealings which the sanitary officers have had with cases of the Texas cattle fever. The pestilential type of this fever was unequivocally asserted by this test alone, even in cases in which the obvious symptoms had not yet appeared.

general symptoms. The bare fact that a destructive disorganization of the blood was not only the invariable result in all the cattle that died or were slaughtered in consequence of the malady, but that wherever the infection was introduced among herds the farmers and common observers recognized the disease by the term "black water," or "bloody water," shows how invariable was this pathological change.

To ascertain the causes and the history of these destructive changes in the blood would be almost equivalent to gaining access to the entire line of the facts which are contained in the causation of the disease. Hence the class of symptoms here mentioned, together with the minute and general changes which the tissues of the infected animal suffered in consequence of the changes in the blood, and especially certain morbid conditions of the liver, the bile and the spleen that would morbidly affect the blood, became the objects of especial study. The researches of the microscopist and the chemist were of the highest service here. And there is reason to believe that the very discriminating study which these scientific experts bestowed upon the questions that were submitted to them in regard to the physiological and chemical events concerned in the spoliation of the blood will be among the most permanently useful labors of the whole investigation. The symptoms and phenomena that indicated these destructive alterations in the blood were worthy of the distinguishing importance that has been attached to them both by the herdmen and medical men.

4. The careful examination of the flesh and all the organs of beeves that came under our suspicion in various abattoirs, with regard to the healthful conditions that might be discovered in such meats. This post-mortem observation very frequently was resorted to by Sanitary Inspector Morris, as a means of verifying or of correcting opinions or suspicions that were based upon slight or equivocal symptoms in the living cattle, or upon equivocal records of the herds. As will be seen in Dr. Morris' special report, there were numerous instances in which the opportunity for the observation and testing of symptoms in living cattle that were under contract by butchers was so unsatisfactory that the post-mortem observation of the carcass and its viscera was deemed important. The fact should be stated here that these post-mortem observations—and we now refer to the mere *inspection* of the carcass and the abdominal viscera—so completely confirmed the trustworthiness of the thermometrical observations, and the special symptoms of the advanced or obvious stage of the disease, that Dr. Morris finally relied exclusively upon the self-registering rectum thermometer and his own personal inspection during the most trying periods of his service as Assistant Commissioner for the State. When it is considered that the latent or incubative period of the disease is protracted through several weeks—always more than fourteen days—and that the temperature test was never resorted to in vain when a doubt existed, and that the post-mortem inspection of several thousand beeves, by Assistant Commissioner Morris and his aids, lent full confirmation to the conclusion that increased temperature was the first, most constant and sure of all means for ascertaining the existence of the disease at any stage in which its presence and effects can in any manner be ascertained, the importance of the records of the temperature will be conceded.

5. Lastly, the observation of the symptoms of recovery or convalescence became important in the study of the disease. The opportunities for such observations were rare indeed. The five sick bullocks that were given up to us by Mr. J. T. Alexander, for observations and medical experimentation as well as for ultimate anatomical examination, were too wild and timid to allow of satisfactory observation of the temperature and other intimate symptoms daily. Greatly as this circumstance was regretted in these most instructive cases, the general observations upon the progress of those cattle toward recovery will be perused with interest. They are recorded in Dr. Morris' contribution to this report. It will be noticed that the temperature of the first of that group of convalescents at the date of his slaughter, and on the seventh day of convalescence, was 103½° Fah. This is precisely 3° less than the temperature observed in the same bullock one week pre-

viously, when he was passing bloody urine and exhibiting all the symptoms of the advanced or obvious stage of the disease.

Though the five infected bullocks here mentioned constituted the only group of convalescent cattle, without complications, which were observed throughout the entire period of recovery, or from the commencement of recovery until the end or until slaughter, there were numerous instances (in all about thirty cases) in which bullocks were brought under Commissioner Morris' official observation when in some stage of partial recovery that had become seriously complicated by excessive or incurable lesions, or by fever and fatal prostration, in consequence of the severities of hurried transportation. If the medical reader of this report will turn to Prof. Chandler's tabulated analyses of the blood of some of these convalescents, the state of the blood in the instances here referred to will be seen to account for the fatal results which ensued in convalescent cattle when subjected to the hardships of transportation or to dry food, etc.

We have referred to the recovery of five cattle under very favorable hygienic care and antiseptic medical treatment at Communipaw. And it is proper that we should express the conviction we entertain that every one of them would have died in a very few days if they had been driven to the butchery sheds in the heart of the city and there put upon hay diet and hard usage. We beg leave here to append the latest statement from Dr. Snow, Superintendent of Health in Providence, concerning the ultimate result of his observations in the case of the convalescent and imperfectly cured bullocks that were under his official direction, and concerning which we have given some account in a preceding section of this report. The group here referred to fell sick on arriving at Providence, the first week in August, and the owners promised the medical officer that he should see the survivors at slaughter, some time in December, if they recovered flesh by that time, as they had no doubt they would before the expiration of five months. As Christmas week was the time designated for the slaughter and examination, we have waited until the printing of this report has been commenced. Under date of January 7th, 1869, Dr. Snow writes: * * * "In relation to those cattle which were sick last summer, I am informed that *they have not grown fat, and are unfit for beef*. It is, therefore, yet uncertain when they will be killed. The promise is continued, and I presume will be remembered, that, when it is proposed to kill them, I shall have due notice and opportunity to examine them."

It will be seen from these records relating to medical observations upon convalescent cattle in this disease, that, like all other observers of the malady, the assistants of this committee came well nigh losing all opportunity of studying the phenomena and history of convalescence. Fortunately we had some rare chances for this class of observations, and they were improved. But had it not been for the unceasing watchfulness of Assistant Commissioner Morris, who permitted no suspected bullock to escape his personal inspection, and the test for the temperature and other symptoms, some of the most instructive illustrations of the disease would have remained unobserved and unrecorded. The explosive suddenness with which the fatal stage of the disease occurs, the rapidity and brevity of that stage, and the readiness with which the dying animals could be, and for a time were, sequestered or abandoned unclaimed, and, most important of all, the rapidity of the putrefaction that immediately ensued upon the death of the deceased bullocks, rendered it a difficult and vexatious task to carry out the plan of searching investigation we had adopted. Distance, weariness, hunger, storms, the rapid transportation, and the quick assembling of all the necessary assistants in each post-mortem examination, were very essential means to the successful results that attended these efforts.

Such has been the history of our efforts to secure a reliable series of medical observations upon the Texas Cattle Disease. These efforts were necessarily made under circumstances of very great inconvenience, in open yards or pastures, upon wild and timid bullocks, with no skilled aids to trust, except the few overworked medical officers whom we have here mentioned, and with only an occasional opportunity to continue the observations for more than thirty-six hours in any one case,

so rapidly fatal was the malady in its stage of obvious symptoms. Imperfect and incomplete as the series of observations continued to be, untiring endeavors continued to be put forth to correctly observe the essential symptoms of the disease in each group of infected cattle that came within reach of the medical officers who had undertaken this inquiry; and it was by persistent and unvarying adherence to the original purpose and plan of the observations that any thing worth having was ultimately accomplished. The total results of the medical observations may, therefore, be summed up as follows:

(a) The duration of the period of obvious symptoms of the disease is brief, and, so far as our observations and other researches can be said to have determined anything in regard to the onset and progress of this short and last stage of the malady, it seems not only to be a paroxysmal stage or period of the disease, but likewise seems to be a *single paroxysm*. That is, the Texas cattle disease, considered with reference to its *obvious symptoms*, is a *fever of but one paroxysm*.*

(b) The symptoms come on, at first, in so sudden and violent a manner as to have led to the remark, in every group of cases we have witnessed in Northern (native) cattle, that the *obvious* manifestation of the malady comes, as the French say, "*par explosion*," or with suddenness and violence.

(c) The symptoms, as well as the observations that have been made in the numerous post-mortem examinations at all stages of the disease, plainly declare the fact that the destructive or disorganizing changes which occur in the proximate elements of the blood, and in the special degenerations of tissue in the liver and spleen are *very rapidly produced*, and that the logical evidence is clearly in favor of the hypothesis that the structural lesions which ensue in this malady mainly occur during the obvious brief period of symptoms. But the symptoms do not yet reveal the extent of the congestive and other changes that may be going on in the liver, stomach, spleen and kidneys, for weeks previous to the explosive or phenomenal and obvious stage of the fever. Such morbid conditions are reasonably inferred by other than symptomatic evidence.

(d) The symptoms connected with the appearance, posture, respiration, pulse, successive changes in the progress of the fatal or obvious stage of the disease, as all that is indicated by the temperature changes, and by the phenomena attending the death of the infected cattle, completely harmonize in the conclusion that all these symptomatic conditions indicate the rapid and fatal operation of a morbid poison, or a combination of poisonous agents. And further, it is demonstrably certain that the invasion of the blood and tissues by that poisonous agency is rapid, and comparatively, that it is sudden, or, that the powers of life do succumb to its morbid power very rapidly and suddenly. So clearly was this fact indicated in our earlier observation of the symptoms and phenomena of the disease, that it led to very scrutinizing search for the morbid *cause* by means of the microscope and chemistry. In other words, the symptoms guided and impelled us to those exact researches which were subsequently made in regard to the pathology and causes of the disease. This has been, therefore, a strictly medical and logical kind of investigation from first to last.

THE SLAUGHTER AND POST-MORTEM EXAMINATION OF INFECTED CATTLE.

This duty was deliberately undertaken, as was noticed in the first section of this report, as soon as permission was obtained. The task was, in all cases, an unpleasant, toilsome and expensive one. It was not a self-imposed task, for it was a *duty*.

*The medical reader of this report need not be reminded that this peculiarity in the type and phenomena of the Texas Cattle Disease renders it strikingly analogous to yellow fever in man. And it should here be remarked, that the observations of Dr. Rauch and Mannheimer, in the infected cows at Chicago, establish the fact that the *obvious* or last stage of the disease is ushered in by a *chill*.

Familiar with the history and requirements of the more exact methods of pathological and medical investigation, the Sanitary Committee and Medical Officers of the Board of Health foresaw many difficulties which they had reason to fear might prevent success in the effort to push such investigations as were essential. 1st. The suddenness of each discovery of the sick bullocks by the Sanitary Inspector and State Commissioner at the herd-yards, and the rapidity with which the fatal stage of the disease ensued, rendered it difficult to make arrangements for a post-mortem in season to find the animal alive at a suitable hour for the inspection. 2d. It was deemed essential that every thing pertaining to the post-mortem investigations should be attended to immediately after killing the diseased animal, and this involved great sacrifices of time and convenience, besides much cost and vexation. 3d. It would almost certainly be found impossible to make perfect work in all the needed branches of investigation, and some points would necessarily be omitted.

The importance of the researches seemed to justify the attempt then, and as the medical members of the Board that constituted the Sanitary Committee advised the effort to be made, the duty was plain. But, in presenting the chief results of the effort, it is due to all concerned that the fact should here be stated that the ability or means for prosecuting all this kind of labor depended upon the voluntary labor and sacrifices by two or three persons, who greatly desired to see the whole work and responsibility assumed by other hands. From beginning to end this class of investigation required infinite toil, patience and rigid regulations for its execution.

The various sketches which have been prepared in chromo-lithography, to illustrate and explain this report upon the disease, have been executed with great faithfulness. They are especially valuable as showing precisely what lesions occur, and by what distinctive marks and colors they are distinguished at the hour of the slaughter and death of the sick bullocks.

In the selection of examples for these sketches of the pathological changes in the disease, there was a careful avoidance of all exaggerated cases or excessive alterations. It was deemed useless to attempt to sketch for printed illustrations, any of the excessively marked results of the disease; for example, the case in which the kidneys had become disorganized, or the spleen had become a mass of diffluent pulp, or, as was occasionally witnessed while the bullock yet lived, the tissues being inflated by the gases of putrescence and decomposition. The sketches relate solely to the average classes of cases of the disease. They were all animals in good flesh and full development, excepting only a few convalescents that were, of course, emaciated by the continuance of the disease.

The first fact that impressed the medical officers concerning the morbid changes produced by the disease was, that the putrefactive process was in full operation almost immediately after death, whether the death was by the pole-ax and knife, or by natural exhaustion. It was all important, therefore, that whatever post-mortem investigations were made, should be confined to slaughtered bullocks, and instantly after life had ceased. That this tendency to speedy decomposition was not due to peculiarities of the weather, or to any other cause than disease itself, would plainly appear from the fact that the cattle, horses and other animals that daily died in the metropolis from other causes, did not undergo such rapid decomposition, nor, especially, did any of their viscera undergo such putrescent disorganization as was found to be the rule in regard to the kidneys, the spleen, the liver, and the fluid blood of the infected cattle. As mentioned elsewhere in this report, these fermentative (zymotic) changes were, in some instances, so fully established before the dying animals had ceased to breathe, that it was found in the dissection which instantly followed the slaughter, that putrescent disorganization was already in progress in the viscera here mentioned, and that gases, resulting from the general decomposition, already filled the capillary blood vessels and the surrounding tissues.

The second very essential fact revealed in the post-mortem examinations consisted in the greatly increased size and weight of the liver, the spleen and the kidneys, and in very important pathological alterations in the two viscera first men-

tioned, so important and peculiar indeed, when examined microscopically and with precision, that no ground of doubt now remains that certain of these morbid conditions may justly be regarded as trustworthy guides in discriminating between undetermined causes and kinds of disease in dead beeves inspected at abattoirs, or in cattle when found dead or brought to slaughter. Yet, this kind of pathognomonic evidence found in the liver and spleen by the microscope, is so constantly associated with several morbid changes which are visible to the naked eye and other ready aids to a judgment, that for ordinary purposes of sanitary and market inspection, the latter can always be relied upon with tolerable certainty. A summary of these conclusions upon the post-mortem inquiries will be found at the end of this chapter.

RESULTS SOUGHT BY MICROSCOPY, CHEMICAL ANALYSES AND THE EXPERIMENTAL TESTS.

The practical usefulness of the microscope, however powerful and perfect the instruments employed in the researches of pathology, is so largely dependent upon the experience, skill and good judgment of the medical observer who uses them, that it is hardly necessary to mention the particular quality of the instrument which Dr. Stiles used in his examinations. But as we have ascertained by correspondence with several good microscopists in western cities where the disease was being observed, that it has frequently been found impracticable to bring into operation the degree of excellence and power of glasses which Dr. Stiles was employing, we will mention, in his own words, for readers who may desire to be informed on this point, that "the more delicate researches were made with a 'Hartnack immersion system,' magnifying, with No. 4 ocular, one thousand diameters."

All who witnessed Dr. Stiles' demonstrations in the field (or the abattoirs) were fully impressed with the remarkable clearness and penetration of his glasses, and with the nicety and skill of his manipulations of the elements that were brought under examination. And as the plan of the pathological researches required that all final conclusions must be based upon results of examinations made of tissues and fluids taken freshly from cattle killed and dying in presence of the medical officers directing the investigations, there is a trustworthiness in the microscopical and other pathological researches in this inquiry such as has rarely been attained. Numerous cattle that were found dead or that died in the absence of any medical observer, were examined minutely, but the conclusions in this report are based upon none of those examinations, though the latter were generally instructive and corroborative in their bearings upon the medical history of the disease.

As the microscope had, in skillful hands, during the past few years revealed the essential character of certain morbid changes that now enable us to determine the nature and name of the fever that has destroyed the life of a person found dead, if the point of inquiry be whether yellow fever or the malignant congestive fever were the fatal diseases, and as chemistry had also come to the aid of the physician in discriminating between various diseases and between different causes of pathological conditions, it was reasonably hoped that some progress toward the ends desired in the cattle disease inquiry would result from the use of these aids. Precisely what results have been reached will be seen in detail in the chapter contributed by Dr. Stiles and Prof. Chandler. Taken by themselves — each fact and each result separately — the real value and significance of the separate portions of all this work cannot be correctly understood. Therefore, we will here present a brief summary of the total results attained in the investigations which have been made.

SUMMARY OF RESULTS IN THE PATHOLOGICAL INVESTIGATIONS.

I. *Concerning the Anatomical Changes or Lesions — Vital Organs that are most Affected in Structure and Function.* The post-mortem inspections showed that the liver, the spleen and the kidneys, the organs which are chiefly concerned in the preservation of the blood from destructive agencies, were the most constantly and seriously affected. No exception was found to the rule that the liver and

spleen exhibit morbid conditions, and are to be regarded as characteristic evidences of the disease; and the morbid alterations in the kidneys seemed to be incidental to an essentially pathological condition of the blood. But, as regards the pathological conditions which have been found so constantly as to be justly regarded as attributes of the disease, there were two elements which may not have depended directly upon any primary morbid alteration in the blood; yet it was plain that all these alterations should be considered as associated results of some primary morbid poison that, so far as we could judge by the evidence, operated chiefly upon the blood and the liver in the earliest period of its fatal work. Reasons for this conclusion will appear as we proceed in the pathological records, where the intimate changes that occur in these organs will be fully described.

Gastric Lesions. The only constant or characteristic lesions of tissues in any portion of the stomachs in the infected cattle were limited to the fourth stomach (*rennet* or *abomasum*), and this lesion consisted in erosions, sloughs and ulcerations of the mucous lining. These were, in all acute and recent cases, mostly limited to the tubular or pyloric portion of that stomach. Their appearance is correctly shown in plates 6, 7 and 13.

The folding and expanded, or omasal portion of the abomasum, though excessively congested and almost purple in appearance in certain cases of the disease, was found sloughed or marked extensively by ulceration only in chronic or slowly convalescing cases. Plates 3 and 4 show the appearance presented by the cases last mentioned, while plate 4 shows the appearance of the abomasum and omasum in one of Mr. Thomas' Indiana herd, which was slaughtered and sketched in the field August 13th, near Hudson City, N. J. It is almost the only instance in which the entire lining membrane of the rennet, or fourth stomach, was wholly unbroken by erosions or sloughs; yet the bullock was in a dying condition when killed. It would appear quite probable that the lesions in the fourth stomach result primarily from intense engorgement and stasis in the vascular structure of that stomach, and that this lesion occurs in the dense fibrous structure of the tubular section, where the sloughing and erosion of mucous membrane have been chiefly observed. Though the constricted or closely adherent relations of the membrane throughout the tubular or "reed" portion of the abomasum may justly be deemed a sufficient reason for its having become the seat of the only characteristic lesion in the stomachs, the normal constriction of the part rendering this mode of sloughing or breaking down of mucous membrane, when engorged with disorganized blood, a natural and certain consequence, yet it was deemed important to search diligently in that and other portions of the gastro-intestinal lining, to discover if any parasitic or fungus organism might chance to be associated with such a peculiar kind of lesion of the membrane. None was found. But to the pathological anatomist the causes of this lesion cannot appear doubtful, particularly when it has most extensively appeared in those cases in which the structures and functions of the spleen (as the grand *diverticulum* for the excess of blood flowing to the stomach) are considered. This class of lesions in the *fourth stomach* was so constant (though greatly varied in amount) in the whole membrane of infected bullocks examined by the Board's officers—that when properly discriminated from the lesions produced by ordinary gastritis—that, as Assistant Commissioner Morris has justly remarked, "the ulcerations, or rather the peculiarities, that were found in the tubular portion of the rennet, or fourth stomach, and at the base of the longitudinal folds in that stomach, finally appeared to be a surer guide to a recognition of the disease than was the mere appearance and size of the spleen or the liver—the absolute tests by the minute examination of the liver, bile and spleen-pulp by the microscopist, and the historical and symptomatic history of the animal before death, being, of course, preferred to all other kinds of evidence. Yet, to the practiced eye, these ulcerations, sloughs and erosions served as trustworthy guides in deciding the nature of any case in which for the moment the other kinds of evidence were not accessible." The plates which are given in this report, to illustrate the gastric lesions, present a fair average of them, both in regard to extent and morbid coloration, etc.

Intestinal Canal. The lesions found in the intestinal canal were regarded as being important only as illustrating, first, the existence of passive engorgement in the mucous membrane at various sections, principally in the cæcal portion (plate 9, figure 1), and in the rectum (plate 14 and plate 8, figure 2). The mere congestion which was always found in various portions of the small intestine seemed to be wholly unimportant, except so far as it showed very happily the nature and universality of the capillary engorgement that occurred in the acute or last stage of the disease. Plates 14 and 15 illustrate this condition of the intestinal mucous membrane.

Constipation seemed to be the usual condition of the bowels during a number of days preceding death in the infected cattle. The intense and deep engorgement of the rectum and the perirectal tissues in the sick animal was a very noticeable fact. So, also, was the presence of bile in the intestinal tract in most cases, even in those that were great sufferers from constipation. The question will naturally be asked, but we cannot answer: "Why was there constipation when an ample quantity of bile was found in the intestinal canal?" But this fact may here be stated, viz.: that in feeding rabbits and mice upon breads and salads saturated with the bile from these infected beeves, diarrhoea was rarely produced, though such feeding, for the purpose of infecting those small animals, was, in some instances, continued daily for more than a week.

Condition of the Lungs and the Areolar Tissue. The lungs were in all cases found in a healthy condition, or at least unaffected by the disease except in a very small percentage of the cases in which the infected bullock had been for many hours incapable of changing his posture, when hypostatic congestion of a portion of the lungs was noticed. The question was often asked: "How is it possible that so great a degree of disintegration of the blood produces so little congestion in the lungs?" The fact is as we here state it, and until analytical chemistry had proved that the blood in the late stages of the disease is watery and thin, it certainly was difficult to comprehend the reason for what we saw. Yet the fact must be borne in mind, in regard to the type of the disease, that it is *not* an inflammatory malady, and is not characterized by fibrinous and plastic exudations in any tissue of the body. It is true, however, that in a few instances there existed a marked degree of infiltration of the areolar tissue with serum and the fluid resultants of blood dissolution; and in reference to this there is an important fact to be stated in another place. The occasional occurrence of interlobular emphysema was, in all instances, observed associated with and plainly dependent upon the extrication of putrescent gases in the capillaries and the free areolar tissue. In one instance every portion of the dying bullock's areolar tissues was thus inflated with gases. General oedema and anasarca were occasionally observed, and copious effusions also in the more chronic cases, in which either the period of incubation had been (as we ascertained) unusually protracted, or in which there were ineffectual and lingering efforts at convalescence. The latter class of cases possess peculiar interest, and have proved wonderfully instructive as objects of pathological and hygienic study.

Special Conditions observed in the Serous and the Mucous Membranes. The endocardial or lining membrane of the heart was found in certain very acute cases of the disease to be marked by minute ecchymoses, and in two instances the entire endocardial surface was deeply ecchymosed. These marks of blood changes and extravasation beneath the serous linings in the heart and blood-vessels seem to be precisely similar to those often seen in cases of yellow fever.

The pleuritic cavity rarely contained more than an ounce or two of serum, but the abdominal cavity always contained more or less, and it usually appeared to be blood-stained. Though, with the exception of two bullocks that had suffered extensive complications, resulting from extravasations into the areolar tissue pertaining to the intestines and the surrounding fat, there were no traces of inflammation of the serous, or other tissues of the peritoneal cavity, there nevertheless was usually found in that cavity a quantity of bloody serum, as just stated. This varied from a quart to more than a gallon. In numerous instances it was deeply tinged

with brownish yellow, like the fat. This effused fluid possessed, in some instances, the property of spontaneous coagulation in the open air. Dr. Stiles describes some curious phenomena exhibited by the fluid, and indicating that it contained some pseudo fibrine.

The mucous membrane of the gastro-intestinal tract exhibited no chronic alterations in structure, except in the slowly convalescent or very chronically sick cattle, and in all those cases the lesions were limited to the abomasum (fourth stomach.)

The softening, the erosion, sloughing, and the blackened patches* of the mucous membrane in the abomasum, in acute cases of the disease, were plainly due to the blood changes; while on the other hand, the peculiar ulcerations and cicatrices in the tubular portion of that stomach, and occasionally at the base of the folds, indicated the fact that some of the sloughs that had occurred during the disease carried away all the tissues, quite down to the muscular structure. The latter class of lesions was found mostly in such diseased animals as were making ineffectual efforts at convalescence. Plates Nos. 3 and 21 illustrate such a case. Plate No. 22 presents the appearance seen in the first convalescent ox that was sacrificed for dissection in the reserved group of five from Mr. Alexander's herd. This animal was rapidly recovering, and had not passed "black water" for six or seven days.

The morbid appearances usually observed to exist in the intestinal mucous membrane are shown in Plates 11 and 14. The deep engorgement in the mucous membrane of the rectum, as seen in Plates 11 and 21, was occasionally wanting, though usually very marked. Indeed, the blood-stained appearance of the excremental droppings was one of the means by which the presence of infected animals was occasionally detected by Dr. Morris and his yard inspectors, so almost constantly was this symptom present in the sick cattle, before an obviously morbid condition of the animal was discoverable. In only a single instance was the muscular and areolar tissue of the rectum found deeply involved in the engorgement, or in an inflammatory process; nor was the mucous membrane, colon, or any other portion of the intestinal canal, found to be sloughed or ulcerated. The fourth stomach (abomasum) alone exhibited this lesion. The only instance in which this kind of destruction of mucous membrane was not observed, was in the case represented in Plate 4. This exceptional case was plainly on the verge of extensive sloughing or erosion of the lining tissues of the abomasum, for it was already deeply ecchymotic. This was a very marked case from Farmer Thomas' herd, and was killed for dissection August 13th. The sketch was made by the artist instantly upon removal of the organ from the carcass.

The mucous membrane and all appearances of the mouth, pharynx, œsophagus and nostrils were normal, with the exception of a jaundiced hue that was noticed in some cases that had continued many days. But in acute cases, as in that from which the stomach last mentioned was taken, the mouth and lips had a clear but somewhat injected appearance. This is shown in Plate 8, Fig. 1, together with a common accidental ulcer that chanced in this case to be present.

Post-mortem appearances of the Brain. In three instances the condition of the brain was carefully examined, because it was presumed that those particular cases might be found to have suffered from acute meningitis or from cerebral congestion. No trace of actual inflammation was found, but there was evidence of congestion of the cerebral vessels in two of the cases. The medulla oblongata was examined in these cases, and sufficient effusion was found in one instance to have produced morbid, nervous and muscular phenomena. Yet the observations finally led to the conclusion that all, or nearly all the delirious actions, distorted movements and

* The blackened patches and puncta, when minutely examined, were found to be simply extravasated blood, rendered black by the gastric juice, the mucous membrane at those points being softened and broken. The occasional presence of genuine "black vomit" in this stomach (the abomasum or rennet), only illustrated this pathological alteration of blood and tissue in an extravagant degree.

postures, and comatose conditions that characterized various cases, were attributable to the toxæmia which constitutes the essential quality of the disease.

The Pathological Changes found in vital organs which are chiefly concerned in Depuration and Conservation of the Blood. The importance of the blood changes was so manifest and all-pervading in the disease, that it was deemed necessary to search very carefully for whatever structural alteration the liver, the kidneys and the spleen might exhibit in the various stages of the disease. The fact, that the lungs presented no lesions has already been stated, and we may now refer to the three other vital organs upon which the conservation of the blood depends. And for the purposes of this report it will not be needful to encumber the record of mere observations with any statements concerning the normal structure or the functions of these organs. And in regard to the morbid histology of most minute structural changes discovered in each of these organs by means of the microscope, all the conclusions that can properly be published are presented in Dr. Stiles' report in the succeeding chapter. The statement we would here make will refer to the grouping and total quantity of results of the morbid alterations in these organs, so far as a reasonable judgment may now be expressed concerning them.

The Liver. Increase in weight and volume was a constant fact. Taking the normal standard of weight of the liver to be from eleven to fifteen pounds avoirdupois, the average degree of augmentation in weight was found to be equal to about thirty per cent above the normal weight. The most excessive weight was found to be thirty-three pounds, the steer being one of medium size, estimated at a gross weight of 1,200 pounds, one of farmer Thomas' herd, killed in the moribund stage four weeks after the first exposure to the Texas infection.

The increase in the size of the liver kept pace with its increase of weight. This increase in size and weight in all cases consisted chiefly in the excessive engorgement of the portal blood-vessels, but in the cases that had been long in progress there was such a degree of fatty and "waxy" degeneration as to add largely to the volume of the organ. This was the case with the liver exhibited in plate 17, which weighed upward of twenty-three pounds, and was taken from a young bullock that was slaughtered in the moribund stage of the disease and after a long continuance of it, the entire period being probably not less than forty-five days. The shape of the liver was in some instances, as in this one, distorted by rapid increase in size. There were some instances in which a waxy condition of the liver was unattended by engorgement with the blood, but in no instance was the liver found in the very "dry" condition that occurs in long protracted fatal cases of yellow fever in man, though in several instances that condition was in some degree established. The later observations in autumn clearly indicated that the "waxy"* change occurred in the animals that suffered long with the disease. This was most strikingly illustrated in the ox that was killed for dissection on the 18th of October, and some of whose morbid conditions are strikingly represented in the several figures in plate 23. This liver weighed eighteen and a half pounds, and strongly resembled the "dry" condition in persons who die after twelve or fifteen days' suffering from yellow fever.†

Before concluding these statements concerning the obvious and essential alterations found in the liver in this disease, it is necessary that we should remark, that no special importance is attached to the ordinary and familiar modes of observation and description. The color and consistence of the liver were not in all cases so obviously changed as to attract special notice. The morbid condition of the bile, and especially a certain quality it displayed when tested upon blood globules, dis-

* As described by the histologists, or under microscopical observations, this alteration in structure consists in a thickening of the walls of the secreting cells of the liver.

† The chief pathological changes in this disease of cattle promise to throw so much light upon those of yellow fever that we deem it proper to call attention to such points of resemblance wherever there is an essential and characteristic alteration of structure, etc.

solving them almost instantiy, as described in the next chapter by Dr. Stiles, rendered it very desirable to have scrutinizing examinations made in regard to the intimate or integral changes that might be found in the minute organization and structure of the liver. The pathological alterations in a viscus so elaborately organized and structurally guarded as the largest and most constantly active of all the secreting organs of the animal system—the liver—may suffer grave and dangerously injurious pathological changes both in structure and function, and still retain a fair appearance upon its surface. And as regards the discoveries that Dr. Stiles has made in his researches into the morbid alterations in the liver, and incidentally, into one of the most important elements in its pathological structure, namely, the ultimate distribution or reticular structure of the biliary duct system, it plainly appears that no ordinary observations could ever have reached such definite results, or have added such welcome and very necessary facts for guides to the proper interpretation of the nature and consequences of the malady we are here considering; and important, too, for the more exact understanding of certain most destructive human pestilences.

The morbid and morphological changes and abnormal elements discovered at the outset in the bile of the diseased cattle, served both as a guide and an incentive to patient researches and experimental tests. The next chapter will sufficiently explain the nature of this interesting line of investigations. But let it be remembered, that the first fact that was demonstrated or asserted concerning the source or carrier and vehicle of the contagious cause was this, namely, that the excrement of certain Texas cattle is directly chargeable with this unfortunate evil. Hence we came to regard with interest whatever abnormal elements or properties the bile of the diseased cattle possessed, because it is a ready vehicle for carrying into the excremental droppings whatever may pertain to it. The experimental investigations in regard to the fungus organisms found in this morbid bile are still in progress. In this branch of inquiry we invited and obtained the co-operation of Prof. Ernst Hallier, of Jena. That gentleman is justly regarded as the highest living authority in experimental and analytical researches of this sort in the study and cultivation of the microscopical organisms that infest plants and animals. Prof. Hallier's plan of inquiry in regard to the fungus organisms that are found in the blood and bile of the sick cattle will be found in a subsequent section of this report. Though this particularly abstruse line of inquiry has been only collateral to the first objects that were to be kept in view in the work, and though the actual relations of the fungus spores in the blood and bile may not be fully grasped in the present merely preliminary stage of inquiry, and may not throw any light upon either the source or the essential nature of the disease, at least until naturalists shall have advanced many steps further in the study and analysis of the parasitical fungi, the demands of progressive knowledge require, that whatever facts have been acquired in regard to this collateral, and probably very essential line of studies, should not be timidly withheld from publication. Therefore the committee has advised, that the record of this class of observations should be embodied in this report. And as this parasitical element of the morbid bile has become an object of special examination, we refer to it now as one of the constant elements found in the bile of the infected cattle.

The Spleen.—The most obvious of all the morbid appearances exhibited upon the mere exposure of the abdominal viscera to external inspection is that which the spleen presents in most cases of the disease. The morbid changes that occur in the essential and intimate structure of this organ seem to be equally as constant as those which occur in the liver, but, considering the comparatively subordinate functions that are required of the spleen—so far as its functions are understood—its pathological changes cannot reasonably be regarded as being so important and far-reaching in their influence, as attributes of the disease, as the structural and morphological changes in the liver seem to be. But as the grand *diverticulum* or waste-gates to the portal and gastric circulation, the spleen would inevitably become engorged and swollen to abnormal dimensions, so soon as engorgements and obstructions in the



SPLEEN FROM A DISEASED TEXAN STEER,

that left Texas in June, and was slaughtered in New York in October, 1868, after feeding three months upon the farm of Mr. Alexander, in Illinois. [Gross weight of animal 800 lbs.; weight of Spleen 3 lbs. 8 oz.]



SPLEEN FROM A HEALTHY NATIVE BULLOCK,

slaughtered in New York in October, 1868. [Gross weight of animal 1,000 lbs.; weight of Spleen 1 lb. 10 oz.]



SPLEEN OF A DISEASED TEXAN,

that arrived and was slaughtered at same dates, in Chicago. [Weight of animal 800 lbs.; weight of Spleen 8 lbs.]



SPLEEN OF A STEER THAT WAS SLAUGHTERED IN CHICAGO,

soon after arriving from Texas. [Animal in fair health; weight 800 lbs.; weight of Spleen 2 lbs.]





circulation of blood in the liver, or the liver and the rennet stomach, occurred. This is an accepted deduction in physiology, and requires no further remark in this place.

Yet it is not certain that the mechanical and anatomical disturbance which the disease produces in the spleen does not finally induce morbid conditions in it, or, as seems probable, so cripple and overwhelm its special but securely known functions, that the total suspension of those functions may contribute toward the rapid and fatal dissolution of the blood itself. The fact, that the spleen is generally believed by physiologists to be charged with some special duty toward the repair of the blood corpuscles, or at least the duty of completing the normal dissolution of the defective and worn red corpuscles,* gives peculiar interest to the pathological inquiries concerning the share the spleen has in this disease. Dr. Stiles has carefully described the degenerative and other structural changes which the microscope revealed in the cases which he examined. The very constant presence of crystals of hæmatoidine in the enlarged cells of the spleen, together with the peculiar yellow flocculi, such as were found abundantly in the blood and the bile of every infected bullock, must be regarded as important circumstances.

Theories regarding the relation of the spleen changes to the disease or to its fatal termination, are of minor consequence, for physiologists and pathologists will not hesitate to agree with Dr. Stiles in the very reasonable opinion, that all the essential changes in this organ of the infected animals are of a secondary character. The diseased conditions which were uniformly found in the liver and in the fourth stomach, would inevitably be attended by engorgement of the spleen.

There were four or five instances in which cattle were found dead with this disease in the metropolitan market yards, or abandoned by the wayside and dissected at the rendering dock, in which the spleen was said to be found ruptured. The fact is, that in every such case, this organ was also found in a state of total disintegration—a mass of diffuent pulp. Descriptions which have been forwarded to this committee of post-mortem appearances of the spleen and other viscera found in diseased cattle in various places in the Western States, show that the instances are not infrequent in which the spleen is found in the condition here described, particularly if the infected animal lingered to die in the natural way. The sanitary authorities of Chicago, Illinois, having ascertained, through Dr. John H. Rauch, their intelligent Sanitary Superintendent and Registrar, that an increased weight and volume of the spleen were the most readily observed facts to which they could officially direct the attention of butchers and meat inspectors at the immense slaughter-pens of that city, where Texan and Western beeves are killed for packing as well as for the city stalls, ordered, that all spleens should be carefully and separately weighed, and, that excessive enlargement and disorganization of this organ should be regarded as sufficient evidence for the condemnation of particular cattle and herds, so as to prevent sale and slaughter. Though an engorgement and very great enlargement of the spleen may occur from various other causes than the Texas cattle infection, this test, which was adopted by Dr. Rauch for convenience sake, and fully approved by Prof. Gamgee, undoubtedly served the practical purpose of the sanitary authorities of Chicago exceedingly well.

* The difficulty hitherto experienced in all efforts to demonstrate the nature and functions of the spleen and the thymus gland, need not prevent us from adopting the conclusion, that notwithstanding the morbid alterations in the structure and functions of the spleen may be secondary to those in the blood and the liver, they nevertheless can contribute important results to the final fatal end. As that philosophical writer, Dr. John Simon, has said of the thymus gland, that "it seems to serve the purpose of a sinking fund in the interest of respiration," so it may be said of the spleen, that it serves as a sort of "sinking fund" in the interest of the worn and expiring red blood globules, and of a sound state of the circulating blood. And, continuing the figure, it may reasonably be presumed, that the destruction of the "fund" may, in the critical exigencies of disease, contribute to the general disaster which the blood and life itself must suffer. At any rate, this illustration aptly conveys, in a homely way, a correct idea. We would invite attention to the results attained by Mr. Stiles in his study of the changes, both morbid and conservative, that occur in the spleen in this disease.

Dr. Rauch has politely furnished us a transcript of the entire record of the weights of spleens and livers that were inspected under his authority at the Chicago slaughter-pens. The record of the native cattle (Illinois and Missouri stock) shows that 4,918 were killed, and that the average weight of their spleens was 1.35 pounds each; while the record of the freshly arrived Texas cattle shows, that 3,485 were slaughtered, and that the average weight of their spleens was 2.28 pounds. The details of these records show, that the spleen in native bullocks rarely exceeded one and a half pounds, excepting in the case of those that were suffering from Texas cattle disease; also, that, in the Texan cattle recently arrived, there were particular herds in which nearly one-half of the bullocks had this organ so greatly enlarged that it weighed between two and a half and four pounds, or an average of nearly three pounds.

The wood-cut, No. 1, on the preceding page is sketched from a photograph, presented to us by Dr. Rauch, of a group of healthy and unhealthy spleens. In the second sketch is shown a group selected by Sanitary Inspector Dr. Janes at one of our city slaughtering houses, the small and natural specimens being from native or State cattle, the enlarged ones being from infected Texas steers freshly arrived from Texas by way of Illinois.

The term "splenic fever," which has been applied to this disease, and the term "*milzbrand*," that is applied to a group of anthracic fevers in Central Europe, do not convey any correct idea of the essential nature of the diseases to which they are applied, though they thus prominently mention an organ which, from peculiarities in its anatomical construction, readily takes on certain very obvious morbid appearances.*

It would be difficult to find in the whole category of human diseases so striking an illustration of the disintegration and ultimate destruction of the blood associated with so extensive and so rapidly produced fatty degenerations of tissues in the liver, spleen and kidneys. Yellow fever and malignant congestive (intermittent) fever are respectively attended by some of these changes; but we have witnessed no disease previously, in man or the lower animals, that has afforded such an opportunity for *demonstrating* the mode and the various results of blood-poisoning. The wasted, crippled and shrunken red globules; the transudations and ecchymoses resulting from this drainage of the vital fluid; the injurious and obstructive

*The familiar and expressive terms in which some of the best medical observers of the Texas cattle disease in Missouri and Kansas have described the symptoms, and the pathological changes produced by it, serve to convey some important facts which will explain various apparent discrepancies that have appeared in the descriptions of post-mortem appearances. The fact, that the sanitary officers could make no scientific use of the putrescent mass of viscera which was almost invariably found upon opening an infected animal that had been dead more than an hour or two will explain, also, how different are most of the descriptions of their post-mortem dissections from those published elsewhere. For an illustration of the first-rate descriptions which have been given by some western observers, who have been many years familiar with the disease, we quote the following extract from a report of Dr. Albert Badger, Nevada City, Vernon county, Missouri. Concerning post-mortem appearances he says:

"In a very close observation of this disease among my own and neighbors' stock for the last thirteen years, I have generally found on opening those that had died but very little blood, and the following results: In those that passed water mixed with blood the kidneys and surrounding parts were entirely decayed, the other parts of the body sound. Those that did not dung at all, or but very little, with manifolds perfectly dry and partly decayed, while the large stomach would be more or less mortified, other parts healthy. Those that appeared to dung and pass water naturally, with a liver more or less decayed, the gall bladder always swelled to its greatest tension, other parts healthy. Those that were ever on their feet in a watchful attitude, the brain was found more or less decayed. This leads me to believe the disease to be in the blood, which finally becomes congestive, destroying the parts in a few hours after it becomes seated, and no doubt in many cases could be cured if we knew exactly when and where it had seated itself—blood-letting not being sufficient of itself to check the inflammation. The hollow horn and tail no doubt is caused by the fever destroying the blood in the extremities before it does in the vessels, which it does destroy in a great measure before death."

presence of resultants of this damaged blood in the tissues of the liver; the overwhelming of the spleen by the *debris* of the *spoiled* blood; the views which the microscope revealed of the condition of this *debris* and of the splenic tissues in the fatal stages of the disease, and during successful convalescence; and lastly in cases that lingered beyond the acute stage, the presence of crystallized *hæmatoidine*—that beautiful signet and memorial of the destroyed blood globules and consequent transudations—in all loose tissues and the chief secernant viscera of the body, presented, together and in their various relations, the most remarkable, the most instructive, and, when studied with all the associated facts, the most conclusive results that could be met with in the physician's searches into the nature and consequences of pestilential diseases.

It would be impossible, in a mere report of events and particular results in the committee's investigations, to place all of the more interesting and conclusive circumstances on record concerning particular observations in individual cases of the infected cattle. Each case, when carefully dissected and studied, presented striking "memorial tracings" of the morbid changes that occurred in the blood. For example: An infected bullock was killed for dissection October 18th, at the National Drove Yards on Third and Fourth avenues. [This bullock's jaundiced skin, waxy and fatty liver, and partially restored spleen, are represented in plate 23.] The fat surrounding the kidneys, and to some extent that of the omentum, was of a greenish and mottled appearance, and the cellular tissue contained some opaque serous fluid. The dissector cut the discolored fat with caution, saying there must be pus in it; but it was simply a mass of hæmatoidine crystals, which remained there as a signet left by the disintegrated red globules of the spoiled blood. In other cases, both lingering and acute, brilliant and discolored spots in pelvis of the kidney were found by Dr. Stiles to consist of hæmatoidine. Besides this beautiful seal, which the disease impressed upon the granular and cellular tissues, there always could be traced other series of proofs of the nature and results of the blood changes.

[Dr. William Aitkin, in his remarkably instructive chapter upon "Symptoms and Signs of Disease," happily epitomizes the facts relating to the source and significance of hæmatoidine crystals found in the tissues and closed cavities of the body, in the following remark: "Crystals of hæmatoidine are the most frequent products of blood degeneration (Virchow). They are formed spontaneously out of hæmatine. * * * If large masses of extravasated blood continue to lie for any length of time, this is the substance into which the blood is transformed. An apoplectic clot in the brain, for example, is repaired by a large portion of the blood (the clot) undergoing this transformation, and the color of the resulting cicatrix is due to the crystals of hæmatoidine. When a young woman menstruates, also, the cavity of the Graefian vessels, from which the ovum escaped, becomes filled with coagulated blood, and ultimately hæmatoidine crystals are the last memorials of the event (Virchow)."]

The Kidneys. Dr. Stiles submitted specimens of this organ to microscopical examination from all the cases of which he also had opportunity to examine the liver and spleen. The changes in structure are in harmony with those found in the latter organs and in the blood. The kidneys, indeed, contained very important evidences and signets of the rapid destruction which the red blood globules had undergone. Nothing could be more significant than the lodgment of crystals of hæmatoidine in the tissues of this depurative gland. The average general appearance of the kidneys in the infected bullocks which we slaughtered and dissected for purposes of scientific investigation is correctly shown in the plate on the next page. This specimen (Plate 19) and its mate (Plate 20, fig. 1) on the page following, were taken from a young bullock slaughtered at the National droveyards, One Hundredth street, September 26th. The two weighed five pounds eleven ounces. The appearance of the kidney during convalescence, at the end of seven or eight days in progress of recovery, is represented in Plate 20, fig. 2. This specimen was taken from the first convalescent of Mr. Alexander's herd, August 16th.

In many instances the morbid appearance was less marked than in the examples here represented; but in still more cases there was vastly more alteration in appearance, and with scarcely an exception, as is reported by all observers, there is usually a more morbid appearance of the kidneys than that which is here exhibited. But it is not the mere appearance, but in certain morbid changes which the microscope alone can reveal, that this organ has aided the general inquiry concerning this disease. Often, in the post-mortem inspections of cattle found dead, and in those slaughtered and allowed to remain a few hours, the kidneys were found utterly disorganized and almost as diffuent or broken down as the spleen in the same animals. A marvelous rapidity of disorganization and putrefaction of this and every other organ that was similarly engorged with blood, will be remembered by all observers as a decided characteristic. But it is a fact to be noted, that the kidneys, as well as the liver, kept up a remarkable activity of secretion, or at least of evacuation of morbid secretions, until a very late state of the disease. The source and nature of the "black water," or hæmaturia are correctly illustrated in Dr. Stiles' report (Plate 7), and in the chemical analyses of urine and blood, by Professor Chandler. The loss of blood albumen by the kidneys in this disease is in all cases enormous, and the blood analysis shows, that this loss goes on *pari passu* with the disease, so that in long protracted cases it reaches a minimum percentage of the quantitative results in the table of analysis.*

The report of Dr. Stiles which follows in the next chapter, adequately sets forth the results of microscopical examinations of the three vascular organs that we have mentioned in this section, as being the chief objects of interest in those pathological researches. All other organs and tissues of the body were in turn examined, but it was in these three organs, the most susceptible to morbid alterations in their organic and interstitial constitution, while, also, the respective functions which they severally perform in preparing the blood for its continued flowing as the healthful supporter of life, that distinctly and very peculiarly characterized alterations in structure, most important, far-reaching and fatal in results in the infected cattle were observed. But the statement must here be repeated, that it is not in the fortuitous changes of color, size and apparent healthfulness of these organs that the question of their healthful or their diseased condition is determined in an acute malady like this of the Texas cattle disease.

Devoted to special and vitally important functions of blood preservation, each of them containing characteristic marks of morbid conditions induced by the poison of the disease, and each in its own peculiar way, finally becoming embarrassed in function and organic structure, these organs were the subject of daily study by Dr. Stiles and various medical observers for more than three months. The results of that study have been worthy of the labor bestowed, for very important facts have been ascertained which throw light upon the nature and course of the disease that was under investigation, and at the same time contribute to the progress of important branches of medical knowledge.

NOTE ON SPECIAL CONDITIONS OBSERVED IN CONVALESCENT CATTLE THAT WERE SLAUGHTERED FOR DISSECTION.

In the report by Dr. Morris will be found an abstract of notes taken at the post-mortem examination of the five convalescent cattle belonging to Mr. J. T. Alexander's herd. They will repay perusal. Much might be added to these notes that would be interesting to pathologists, and also would be important to farmers and herdsmen that may have to deal with the disease. We will briefly recapitulate the most essential facts observed in the examination of animals known to be convalescent from the disease:

*The decrease in the percentage of albumen in the blood manifestly depends upon three causes, viz., loss by waste through the kidneys; loss by the destructive effect of the fever in which this food for the blood has to meet unusual demands; and lastly, the failure of the sick animal to supply by its digestion of daily food.

1st. *External Appearances.*—For several days the eyes appear jaundiced, the skin also, in certain cases, was seen to be deeply jaundiced; and this is strikingly shown in the case of a bullock that was slaughtered on the 18th of October, after being at least ten days past the commencement of obvious symptoms. The appearance of this animal is correctly shown in Plate 23, Fig. 1. The cases examined late in the autumn, like the one here mentioned, had oedematous legs, and exhibited a very flabby condition of surface.

2d. *The Temperature.*—Examined per rectum, the first of Mr. Alexander's convalescents (slaughtered August 16th) on the seventh day after last of the hæmaturia, gave a temperature of 103° Fah. The other members of that convalescent family, which came to their dissection for scientific purposes on the 26th of August, from twelve to sixteen days past obviously acute symptoms, gave the following temperatures: No. 1, 103° ; No. 2, $103\frac{1}{4}^{\circ}$; No. 3, $103\frac{1}{2}^{\circ}$; No. 4, $103\frac{1}{2}^{\circ}$. In other instances of cattle partially recovered from the disease, there usually was some complicating condition that kept up the febrile temperature, as in the bullock whose jaundiced skin is illustrated on the preceding page. His temperature, when ten days or a fortnight past the obviously acute stage, but when suffering intensely from inflammation of the rectum and colon, and from the extravasation of his anæmic blood into the cellular (areolar) tissues of the body, was $105\frac{1}{4}^{\circ}$. In several of the imperfectly recovered Texas cattle, examined by Sanitary Inspector Jones at one of the butcheries—cases quoted by Dr. Morris in this report—the temperature was two degrees or more above the standard of health.

3d. *Condition of the Blood.*—In all the convalescents it was remarkably deficient in red globules and globuline, and in the percentage of salts, of albumen, and of total solids. This is shown in the chemical analysis of the blood of diseased bullocks by Prof. Chandler. [See his *Tabulated Analyses.*] The same fact was confirmed in the microscopical examinations of Dr. Stiles, in regard to the destruction of the red globules.

4th. *The Spleen and Liver.*—In every convalescent these organs exhibited evident traces of the disease. The weight and the unnatural appearance of the spleen seemed to be very tardy in the return to normal conditions. The spleen of the first examined convalescent in Mr. Alexander's herd (on the seventh day) weighed five and a half pounds, and was still soft and discolored; while the liver weighed thirteen and a half pounds, and was fatty and fawn colored. In convalescents killed later in the season, the "waxy" conditions were conjoined, and the former was evidently supervening upon the latter condition. In Plate 23 a section of such a liver is shown, also a section of the spleen. They evince a tardy return toward the healthy state.

5th. *The Abomasum or Fourth Stomach.*—A rapid tendency to recovery from the common erosions and ecchymotic conditions in the tubular or "reed" portion of this stomach, was evinced in the well conditioned convalescents; but the deep sloughs and ragged ulcerations recovered slowly. Plate 21 exhibits the appearance of the tubular or "reed" portion of the abomasum in the first bullock killed in Mr. Alexander's group of convalescents, at Communipaw.

6th. *The Bile, the Blood, and the vascular organs* concerned in blood elaboration, continued to exhibit the yellow flocculi or pigment matter and the hæmatoidine crystals for some time. But the fungus spores ceased to be found quite early. The completeness and rapidity of this disappearance of the fungus parasite in the cattle that were medicated with carbolic acid was, at the time, a subject of unexpected satisfaction. It was reasonably presumed to be due to the action of the carbolic antiseptic upon the blood.

EXPERIMENTS TO TEST THE SUPPOSED METHODS BY WHICH THE DISEASE MAY BE COMMUNICATED.

In the beginning of our inquiries the fact became so unequivocally established, that, to the excrement of the cattle which introduced the disease was to be attributed the means or vehicle of distribution and propagation of the cause of it, that it was believed there would be a spontaneous demonstration of the possibility or the impossibility of the repropagation of the poison by Northern cattle which were under observation and dying with the disease in the vicinity of New York. The only instances of such repropagation by sick native stock are related by Assistant Commissioners Drs. Morris and Montfort concerning the herds in Orange county.

Dr. Stiles attempted some experiments by injecting a solution of infected bile into the blood-vessels of some of the lower animals, but they gave no other result than that of a speedy termination in fatal convulsions, as soon as the solution mingled in the general circulation.

The constant presence of the fungus spores in the bile of the infected and dying cattle, suggested the propriety of instituting a series of experiments and tests upon such herbivorous and carnivorous animals as could readily be made to partake of simple foods garnished with a little of the morbid bile. To Dr. F. J. Randall, an assistant sanitary officer, the task of conducting the experiments was committed.

Dr. Stiles followed up the examination of the morbid anatomy and microscopical of the fluids and diseased tissues whenever death ended the experiments upon any of these small animals.

The experiments on dogs was inconclusive. Dr. Mackay, the Health officer of Buffalo, had informed us that all his observations in feeding dogs with the flesh of the infected dead cattle ended in poor Tray's vomiting the food. Three dogs were kenneled and fed very sparingly on two of the enormous livers taken from infected cattle that were slaughtered for dissection. Two of them were attacked with an obstinate diarrhoea, and one of them died at the end of twelve days. The stomach of the latter was ulcerated, but Dr. Stiles discovered no traces of the essential signs of the cattle disease. It was scarcely presumed that the dog would readily succumb to the poison, if any pertained to the tissues of the liver and the bile they contained.

The facts regarding the pathological results of this feeding and incubation of the bile-poison, if poison it was, are summed up by Dr. Stiles in the second part of his report. He found all the characteristic lesions which the infection induces, and he remarks that the rabbits "died with many of the phenomena of the Texas cattle disease." Dr. Randall states, that they died suddenly in every instance, after but a brief period of apparent illness. The only fungus spores discovered in the dead rabbits were those known to mycologists as the *Cryptococcus guttulatus*. Regarding the practical inference to be drawn from these experiments, we would not consider them absolutely conclusive, because the absorption of morbid bile into the blood would in all probability produce the chief results that were observed by Dr. Stiles and Dr. Randall. Yet, so far as this series of results has any bearing upon the theory of this fever propagation by means of this germ element, they are regarded by Dr. Stiles as strongly confirmatory.

Experimental tests, showing the effects that would be produced by the transfusion of blood from an infected bullock into a healthy one, was scarcely practicable, as every medical observer was already overworked, and no pecuniary means were available for such experimentation. That class of tests remain to be made, together with several other experimental observations if the infection ever again crosses the Mississippi river.

INDISPENSABLE USES OF THE MICROSCOPE AND CHEMICAL ANALYSIS IN THE INVESTIGATION—RESULTS.

The microscope and the chemist's laboratory are helps to the student of the causes and effects of disease, but they may as readily prove false guides as true, unless they are themselves directed by skillful and thoroughly experienced hands. The success that attended the labors of Dr. Stiles and Prof. Chandler, in their respective branches of investigation, will justly be regarded as among the most satisfactory results attained in the whole range of inquiry. The reports of those two co-laborers follow in next chapters. Divested of the technicalities of such studies, their results may be concisely translated into familiar phraseology, as follows:

What the microscope has revealed concerning the pathological characteristics of the Cattle Disease.—(1.) That the red corpuscles of the infected blood are impaired, and, to a great extent, broken up before the death of the infected animal; and that, immediately after death, the disintegration of this essential and life-bearing constituent of the blood, as well as the other constituents, went on with amazing rapidity.

(2.) The chief change discovered in the liver, spleen and kidneys, consisted in the acute fatty degeneration or deposit, and in certain remarkable evidences of embarrassment in the circulation of the blood and of *destructive changes in it*. The presence of the crystals of hæmatoidine and of a peculiar yellow matter in these organs and in the bile, as well as in loose cellular tissues, were so remarkably demonstrated under the microscope that they came to be regarded as *signets* of the presence and operation of the disease upon the red blood corpuscles. The yellow matter here mentioned also associated destruction of the red corpuscles with the presence of the morbid bile; and this circumstance, in the pathological condition of the blood, was rendered quite certain by other kinds of evidence.

(3.) The diseased *distension* of the minutest biliary ducts by the morbid bile, revealed a physiological fact regarding the minutest and previously undetermined character of the ultimate arrangement of those ducts and their relations to the secreting cells of the liver. This discovery by Dr. Stiles has served to aid in the investigations and deductions.

(4.) The exact nature and causes of the "black water" or hæmaturia, have been clearly defined by the microscope.

(5.) The nature of the morbid changes which occur in the spleen, in consequence of the disease, is clearly defined, so far as the microscope can reveal the altered conditions in that organ.

(6.) The presence of fungus spores, or an infinite growth of parasitical organisms, has been revealed as a constant fact in the blood and bile of the infected animals. And to test and develop, by experimental culture, the actual nature and botanical (mycological) classification of this fungus parasite, has been a separate undertaking. Furthermore, without waiting the results of such culture, the microscopical observations upon the bile, the minute tissues of the liver, and the morbid conditions of the blood, etc., are finally regarded as warranting the conclusion, that whether it may be an active and propagating element in the infectious cause of the disease, or only a concomitant of the diseased and feverish blood in the infected animals, it certainly seems to play an important and fatal part in the final morbid changes that occur in the bile, if the bile becomes, as there is no doubt it does at last, a destructive poison to the nervous centers.

(7.) The microscope has enabled Dr. Stiles, and Prof. Hallier (of the University of Jena), to trace the botanical and developmental history of the fungus element or "micrococcus."

In these and in various other ways the pathological investigation of the disease has been aided by the microscope in the hands of a most learned, careful and trustworthy physiologist and pathologist.

RESULTS FROM CHEMICAL ANALYSIS.

The Blood. In the eight columns that present the results of the quantitative analysis of blood from fourteen infected bullocks that were slaughtered and carefully dissected for the purposes of our investigations, Prof. Chandler has clearly demonstrated the following facts:

(1.) The normal relative proportions of the total solid constituents, and the water of the blood in the infected cattle was found to be changed, the healthful percentage of solids being much diminished, and in the most typical case of the disease this decrease of solid constituents was excessive. In a fine fat steer that had passed the acute or explosive symptoms, and was (ineffectually) convalescent, this decrease of solids in the blood was found to be equal to fifty parts in the 1,000 of blood, or of the one hundred and ninety of normal solids, that is, this loss *exceeded twenty-five per centum* of the natural total of solid flesh-forming constituents in the blood. In other instances in which the disease produced extreme symptoms in very fine and full fleshed animals, as in one that was carried to the rendering dock, and in two that were killed and carefully dissected September 11th and October 18th, respectively, the loss of solid elements of the blood was found to be nearly seventy parts out of the normal proportion (which is about one hundred and ninety) in the 1,000 parts of blood, or equal to thirty-seven per centum of loss of the substance of the blood. But the loss of solid elements was not an invariable fact, though evidently quite sure to occur in extreme cases, and in all instances of lingering beyond a few days after the period of hæmaturia and the acute symptoms.

(2.) In every case of the disease there was a *very marked loss of red blood corpuscles*. The loss amounted to more than fifty per cent of the total quantity that healthy bullocks' blood contains; and, in the most striking cases, the loss of blood corpuscles and globuline was almost complete. In some examples (one of which Prof. Chandler has placed in his tabulated results) the destruction of this most essential element of the blood could not be estimated, so entire was the destruction and change.

(3.) The healthful proportion of salts in the blood was diminished in all the typical cases that had survived a few days after the onset of acute symptoms. The causes of this loss, as well as that of total solids, were physiologically obvious in the class of animals in which it occurred.

(4.) Albumen was quite constantly found below the healthful proportion in most of the cases examined, but it was noticed as an excess of the normal amount in those cases of the disease in which the blood-corpuscles and globuline had undergone such changes as caused the red globule element to nearly or wholly disappear from the list of proximate elements.

(5.) The fibrin varied greatly in amount, but in the phenomena of coagulation, etc., never exhibited signs of an inflammatory condition. In some instances the fibrin appeared rotten and imperfectly elaborated; but in no specimen examined under the microscope did Dr. Stiles notice any unnatural state of fibrillation.

The foregoing five points of departure from the healthful standard of the blood elements are thus specially noticed, because they are directly associated with the essential cause and course of disease.

The dropsical effusions (serum) in the peritoneal cavity of the infected cattle. The effused dropsical fluid possessed the property of spontaneous coagulation when exposed to the air. Dr. Stiles' description of the peculiar mode of that coagulation shows that a pseudo fibrin was contained in these fluids. Prof. Chandler's analyses show that this fibrin was quantitatively estimated. In the remarkable case that was examined the 9th of September, the spleen was ruptured, accidentally, as we believed at the time, in the last struggles, or in the handling of the bullock. [See third analysis of serum and eighth analysis of blood in Prof. Chandler's tabulations.]

Chemical analysis of the bile. The results are recorded without comment. There may be readers of this report who would ask for these results, and the time may come when this class of facts will aid in other inquiries.

The Urine. The albuminous state of the urine was in all cases remarked, and in most instances this wasting of the substance of blood by the urinary organs was extensive. The morbid changes that were occurring in the blood itself, by damage to the red globules and to the fibrin, would account for this wasting, even if the kidneys had not been found to be undergoing acute degenerative changes, and suffering enormous congestion. And it is worthy of notice, that the congestion of the kidneys (usually excessive, but in some cases unnoticeable) did not result in obstruction and suppression of urine, but usually in an excessive flow of it.

Chemical Analysis of the Liver. It was not until cold weather arrived that any analysis of this organ was attempted. The specimens were not as excessively fatty as livers dissected earlier in the season. They were changing into what is termed the "waxy" condition, in which the minute cell walls are simply thickened by plastic matter, and, as before remarked, there was far less fatty deposit than in the livers that were not "waxy." Dr. Stiles states, that the microscopical examination of the livers thus analyzed, contained less than half the proportion of free fat which those had that were examined earlier in the season and in the acute cases. But even the four examples presented in Prof. Chandler's analysis, show an excessive percentage of fat. Here we see no less than sixty-two and a half, sixty-six, eighty-eight and a half and ninety parts, by weight, of fat in 1,000 parts of the liver substance, in livers that had, in the lingering stages of the disease, changed to the "waxy" condition. Frerich found only twenty-two parts of fat to 1,000 of substance in a waxy liver, and one hundred and seventy-two parts in a fatal case of "fatty liver."

In pursuing a pathological inquiry upon yellow fever in man, the writer submitted a specimen of a liver from a sea captain that died of that disease, to Prof. Chandler for analysis. The man had died on about the twentieth day from the beginning of incubation of the disease at the port (Vera Cruz) whence he sailed. The liver was the most perfect specimen of the *cafe au lait*, or dry and fawn-colored condition of that organ, as witnessed in lingering cases of that malady. The following is the result of the analysis: Water, 739.84; total solids, 260.16; fat, 96.31.

Dr. Stiles' microscopical analysis of a specimen of the same human liver, pronounced it a typical example of yellow fever liver, as had also the writer's professional examination of the body and history of the patient the previous day enabled him to do. It seems desirable to place these facts on record here, though they relate to a pestilence in the human family.

Experiments and tests for the verification and settlement of questions that have arisen in the course of the investigations. The chief experiments of this kind relate to the attempts to cultivate the fungus spores that infest the blood and bile of the infected cattle. Though these experiments, and certain collateral inquiries relating to the sources whence they may have been derived, are still in progress, and may be continued a year or more, the chief object of such culture experiments should be stated here. The design of the effort is not so abstruse as may be supposed. Divested of details, and of the marvelous things that are associated with the several stages of development in the parasite fungi, the object and the art of spore and parasite culture may be stated in ordinary phraseology as follows:

The spores or vegetative germ matter found in the blood and bile of the infected cattle, present, in the fresh specimens, certain peculiarities that are sufficiently definite to enable skillful microscopists to recognize them with considerable certainty. We presented to Prof. Hallier, of Jena, sealed specimens of fresh bile from infected cattle, without intimating to him what results Dr. Stiles had obtained, and his description of what he saw exactly accords with what Dr. Stiles and his associates witnessed. This spore growth in the fluids of infected cattle is, so far as Dr. Stiles was able to ascertain, invariably of the low or primordial kind of mere multiplication and growth, which is the germ mass or micrococcus of Prof. Hallier. Growing and repropagating, away from all direct exposure to the atmosphere, this kind of spore is termed *anerophytic*, or growing without air. This circumstance of *anerophytic* multiplication and rapid growth is not singular, for the *oidium lactis*, or fungus of milk—also *anerophytic*—illustrates this kind of vegetation; but it is manifest that the circumstances of such parasitic growths must necessarily occur wholly at the expense of the constituents of the fluid in which they float and multiply, for they grow without the aid of atmospheric air. As the spore forms (or as the *micrococcus*, *cryptococcus*, *zoogloæ* or *cylindro-tænum* forms), of fungus organisms all have relation to the higher and more complex development of plant-like fungi and algae, the planting and cultivation of the micrococcus or spore matter has become an art that promises important results. The very first contributions of the practically useful results of that art were given to hygiene. We refer to the study and development of the fungus forms that pertain to the excrement of the cholera sick. And as the world is indebted to Prof. Hallier, of the University of Jena, for the chief discoveries and improvements that have been made in this difficult art of studying the progressive stages of cryptogamic development from the spore matter or *micrococcus* up to the plant-like stages of growth, we secured the co-operation of that learned naturalist with Dr. Stiles. He has presented his researches upon specimens of fresh bile that we sent to him under seal. The statement of results in this fungus culture, by Prof. Hallier, will be seen in the communication from him, which we append to Dr. Stiles' report in the next chapter.

There is much reason to believe, that this spore growth, which both gentlemen are studying, will be found to belong to certain parasite fungi that infest the coarse herbage which covers certain tracts of country over which the Texas cattle are driven before reaching the Osage, the Red, or the Mississippi rivers. Some of the grasses of that region are already under examination of Dr. Stiles and others. No final results can be reached immediately in such an inquiry, but the clear and definite progress already made in this line of researches is sure not to end in barren uncertainties. Yet it must not be supposed that a correct general knowledge of the "Texas cattle disease" will not be attained independently of this promised contribution from the natural history of the fungus spores of the infected blood and bile of the cattle and of the parasites which infest the herbage of the cattle trail. These toilsome researches may result in unveiling one of the hidden and all-import-

brown on the filter by reflected light, as represented at *a a*, Plate 2. These were in many cases so abundant as to give the bile a semi-solid consistence. They presented, when the bile was most dense, a crimson coloration, and were then mingled with granules and stellate crystals of hamatoidine (Virchow), *c c*, Plate 2. These yellow flocculi abounded in the hepatic duct and its branches, and were found at times impacted so that they might have offered resistance to the flow of the bile into the gall bladder. Some of the yellow coagula had been moulded by the smaller biliary ducts into cylindrical casts, *b*, Plate 2, and were found presenting this shape in the gall bladder. Plate No. 2 represents the appearance of a drop of bile under a magnifying power of five hundred diameters.

It was evident that the source of the yellow flocculi in the bile was an admixture of blood with the bile in the minutest ducts within the substance of the liver. The blood corpuscles being dissolved, the coagulating fibrin imbibed the bright yellow dye of the mingled coloring matter of the bile and the red blood corpuscles.

I have preserved specimens of this morbid secretion for nearly three months. They manifest no tendency to decomposition, but give off a sweetish aromatic odor; crystals of oxalate of lime have formed in the yellow flocculi, and micrococci germs have multiplied so as to form masses visible to the unassisted eye.

(3.) *The liquid contents of the small intestine* abounded in the yellow flocculi of the bile. The hardened fecal masses in the large intestine consisted of homogeneous yellow granules (the result of condensation of the yellow flocculi) mingled with epithelium and vegetable debris. Constipation was a prominent symptom in most cases. Of the bile, therefore, which so abundantly poured into the alimentary canal, but a small quantity left the body in fecal evacuation.

The fourth stomach and intestine were occasionally filled with coagula of blood. Specimens of coagula were sent me, but I did not witness a case of the kind.

(4.) *The Urine.* The urine was opaque and black, with a crimson reflection. It formed a solid coagulum on boiling. When much diluted with water it became of a claret color. Blood-discs were rarely found in it, but coagula of granular fibrin, *a a*, Plate 3, inclosing debris of blood corpuscles and dark crimson granules, and molded into casts of the *tubuli uriniferi*, were of frequent occurrence. The dark red coloring matter of the broken-down blood discs was diffused through the urine.

(5.) *The Peritoneal Cavity* contained a yellow liquid which owed its tint to a diffused coloration, and was spontaneously coagulable on exposure to the air. In one case, where a few drops of blood had been accidentally mingled with it, coagulation continued for two days, and until putrefaction commenced. A fresh gelatinous clot formed in the liquid as often as it was poured from the coagulum previously formed. This was but one among many interesting physiological phenomena revealed by study of this disease.

II. THE SOLIDS.

(1.) *The Liver.* The liver was invariably enlarged and congested, its surface marked by yellow patches, or of an uniform yellowish discoloration. The surface of section presented yellow spots on a ground of deep congestion. Under a low magnifying power, a thin section presented the appearance represented in Plate No. 4. A translucent center of bright yellow was seen in each acinus, *a*, Plate 4, surrounded by an opaque zone, *b*, Plate 4, of mingled fatty degeneration and yellow injection. Surrounding each acinus was the fibrous striation of the capsule of Glisson, *c*, Plate 4. Under a power of five hundred diameters, the yellow color of the center of each lobule was seen to be due to the repletion of the ultimate biliary radicles, forming a regular net-work between the liver cells, with bright yellow secretion, *a*, Plate 5. About this, and shading into it, was a zone of fatty degeneration, which affected the superficial or portal portion of each lobule. This fatty degeneration was sufficiently marked to render the liver cells opaque, but the nucleus was still visible in many of them. The injection of the reticulum of bile ducts was the most interesting phenomenon presented by the disease, not only on account of the opportunity it afforded of studying an anatomical structure, which

has given rise to much discussion among histologists, and concerning which great difference of opinion still exists, and on account of the beauty and perfection of the anatomical demonstration, but owing to the important relation which this phenomenon bore to numerous manifestations of the disease. The cause of the difficulty in determining the mode of origin of the bile ducts, was seen to consist in their fragility and intimate association with the liver cells, each cell on being separated from its neighbors carrying with its portion of biliary reticulum. The delicacy of the membrane forming the walls of the reticulum, renders its thorough injection impracticable, and its recognition, when empty, impossible. The brilliant tenacious secretion of the liver in this disease distends and reveals every portion of the biliary channels. The larger ducts between the acini can be recognized in every carefully prepared section communicating with the intra-lobular reticulum. Immediately after death, the yellow secretion begins to pass out of the reticulum by exosmosis, and to tinge the liver cells with a diffused yellow coloration, so that it is difficult to preserve the biliary reticulum for anatomical demonstration. Plate 6 represents the liver cells examined several hours after death. In other specimens the injection is more permanent, and I have been enabled to save for demonstration portions of diseased liver which still reveal the most marked phenomenon of the disease.

The source of the bright yellow coloration of the bile was evidently in the hæmatoidine (Virchow) of the broken down blood-discs. The coagulating fibrin of the effused blood, absorbing this yellow dye, formed the characteristic flocculi of the bile; the same absorbed by the capillaries of the liver gave rise to the yellow flakes circulating with the blood, and found abundantly in the spleen.

The mucous membrane of the hepatic duct was always of a bright crimson hue.

In one instance, in which the injection of the reticulum of bile ducts was most marked and most permanent, there was no fatty degeneration of the enlarged liver, but a waxy appearance.

(2.) *The Kidneys.* The kidneys, in every post-mortem that I witnessed were enlarged, deeply congested, black on the surface and in section, the cut surface giving issue to an abundance of dark blood. The natural distinction of color between cortical and tubular portion was effaced. The tubuli uriniferi of both the cortical and tubular portion were rendered opaque by a deposit of granules of fat in their epithelium, and their cavity was occupied, for the most part, by coagula, reddened or blackened by debris of blood corpuscles, and by granules of dark crimson pigment, with occasionally a recognizable blood-disc. Plate No. 7 represents the appearance of the tubuli of the kidney, as affected by the disease. The Malpighian bodies were not affected, but blood was occasionally effused within their capsule. The tubular presented the same alterations as the cortical portion. In one instance, in which the projecting cones of the tubular portion presented to the unassisted eye a glittering yellow coloration, it was due to rhomboidal plates and stellate crystals of hæmatoidine. Minute yellow oily drops were occasionally found scattered through the epithelial lining of the tubes.

An interesting alteration in the effused blood was noted in cases of long duration, and during convalescence. The red pigment within the tubuli was changed into melanine, and black pigment granules filled the epithelium of the tubuli. The transformation of hæmatoidine into melanine was beyond question. Long after every other morbid character had given place to healthy structure through convalescence, the cortical portion of the kidneys retained the black coloration due to granules of melanine.

(3.) *The Spleen.* Increased size and weight of the spleen was an invariable accompaniment of the disease. At the same time the consistence was diminished to such a degree that it gave issue to a soft black pulp on section, in which all trace of structural arrangement was lost. The increased size of the spleen was not due to congestion merely. A remarkable alteration was presented by the nuclear and cellular elements of the parenchyma. The nuclei (nuclear epithelium, Robin), or the same with delicate cellular investment, which, in the natural state, filled the closed vesicles of the Malpighian bodies and the trabecular interspaces, were

replaced by the large cells undergoing fatty degeneration, which have been represented in Plate 8. In some instances, yellow flocculi were found free in the splenic pulp; in others, cells filled with black pigment granules and crystals of hæmatoidine were abundant. The appearance presented in Plate 9 always accompanied convalescence. The cellular elements rapidly regained their normal character, but the pulp was filled with minute homogeneous rounded yellow granules, or with spherical or oval aggregations of the same.

(4.) The *mucous membranes* of the fourth stomach and intestines, and of the urinary and gall bladders, presented a diffused redness, with minute petechial spots, in which coagulated blood was found filling the distended capillaries. The epithelia of these membranes presented no marked alteration. The various states of congestion and ulceration in the alimentary canal offered no revelations of interest to microscopical study.

(5.) The *muscular system* presented a darker coloration than in healthy animals, but under the microscope revealed no alteration in structure.

(6.) The *nervous system* was entirely free from discoloration or structural change.

(7.) The *adipose and areolar tissues* were tinged by a diffused yellow coloration. Occasional yellow flakes were found in them, and about the kidney circumscribed extravasations of blood. Beautiful crystals of hæmatoidine were found in old extravasations.

(8.) The *lungs* were remarkably free from acute disease.

PART SECOND.—CONCLUSIONS IN REGARD TO THE PATHOLOGICAL NATURE OF THE DISEASE.

To sum up the results of microscopical investigation, and give the pathological conclusions to which they point, the Texas cattle disease is an acute, infectious, febrile disorder, attended by morbid action of the liver, its most distinctive phenomena being explicable as the results of the hepatic affection. The dissolution of the coloring matter of the blood corpuscles in the liquor sanguinis, and the hæmaturia are consequent upon the entrance of bile into the blood-vessels in whatever manner effected. In the experiments of Kuhne and Frerichs, the injection of bile, or of its salts, into the blood, was followed in the great majority of their experiments, upon the lower animals, by the appearance of blood in the urine. The solvent action of the bile upon the blood corpuscles, and the consequent liberation of their coloring matter can be readily witnessed under the microscope, each disc disappearing suddenly, like a light blown out, and the liquid assuming an orange tint. The blood thus altered in character becomes liable to extravasation, other hæmorrhages than hæmaturia being frequent attendants upon attacks of jaundice.

That bile is mingled with the blood is proved by the yellow color of the serum, its yellow flocculi, its crystals of cholesterine, by the yellow drops in the epithelium of the tubuli uriniferi, by the yellow granules in the spleen and by the hæmaturia. These results cannot follow the mere accumulation in the blood of the constituent elements of bile; the proximate principles of the bile itself are there found. The liver is excited to excessive secretion, the product of which distends to excess the channels and reservoirs of the bile, and fills the intestines. It is not unusual to find cases of icterus in man thus accompanied by excessive biliary secretion.

That the greatest facility exists for admixture of bile with the blood is shown by the repletion of the reticulum of bile ducts in immediate contact with the capillaries of the liver, as well as by the abundance of bile exposed to absorption by the mucous membrane of the intestines. In the experiments of Dr. Randall, under your direction, in which rabbits were fed upon bread soaked in the bile of the Texas disease, death ensued in from one to four weeks, according to the amount of bile consumed. In these experiments the poison was absorbed by the mucous membrane of the alimentary canal. The stomach was found ulcerated and containing extravasated blood, the liver was softened and fatty, the bile was of a bright claret color, and contained coagula; the kidneys were deeply congested; thus death was caused by the absorption of bile, with many of the phenomena of the Texas disease in a chronic form.

The only alternative to this admission of the vitiation of the blood by bile is the hypothesis that the destruction of the blood corpuscles through another agent—that of the infection, for example—permits an accumulation of hæmatoidine, or of the coloring matter of the bile in the blood, beyond the capacity of the liver to remove it. The yellow flocculi of the liquor sanguinis and the spleen would, however, be inexplicable on this hypothesis, while the formation through the agency of the liver is manifested.

Quite early in this investigation my attention was attracted to the existence in the diseased bile of minute vegetable germs, which multiplied abundantly in the various specimens of bile preserved for analysis. They existed in the form of spherical or irregular aggregations of micrococcus (Fig. 1, Plate 10), the nature of which could be determined only by the employment of the highest powers of the microscope, and by studying their development. They were found in fresh blood and bile, but with difficulty. In specimens of bile collected in the evening, they would be found abundantly in the morning; the white color of their aggregations contrasting with the yellow hue of the flocculi of the bile to which they were attached, and from which they seemed to be derived, their abundance being such as to preclude the idea of their derivation from any other source than the blood or the bile itself. A magnifying power of over one thousand diameters and a lens of good penetrating power were necessary to their definition. Within a few hours of removal from the body, numerous cryptococcus (or torula) cells, resulting from the development of the former, were found, often containing crimson granules, as represented in Fig. 6, Plate 10. Specimens of bile and blood were collected from healthy animals and carefully examined, but in no instance did the forms described make their appearance. The ordinary attendants on putrefaction were alone described. Whether these forms of micrococcus and cryptococcus were merely accidental and attendant on a process of fermentation taking place in the bile, or were peculiar to the disease, their presence was an interesting fact, and their nature deserving of careful investigation. Their development was accordingly studied under various conditions. They were planted in solutions of sugar, gum and saliva, which had been boiled in order to destroy whatever germs of a different nature the solutions might contain, and were kept hermetically sealed at a temperature of 100° Fahrenheit for several days. The resulting anærophytic forms (cryptococcus and torula, Fig. 4, Plate 10), were planted on slices of apple, etc., and their development was noted, as represented in Plate 10. After a period of two weeks the planted area was found covered with penicillium, as represented in Plate No. 12, while the rest of the surface was free from vegetable growth. At the same time cryptococcus guttulatus, from the intestine of a rabbit which had been fed on the morbid bile, was also planted on slices of apple, and the germination represented in Plate No. 11 noted. This was done for the purpose of comparison merely, cryptococcus guttulatus being constantly found in the rabbit. The cryptococcus from the bile, however, manifested very different phenomena, although under precisely similar conditions with the former. After two weeks it had merely increased in quantity, aggregation of spores having been formed visible to the naked eye, but no filaments.

These forms of micrococcus and cryptococcus are but grades in the life of higher organisms. Thus, Hallier gives the following forms or "morphen" of *Achyla Prolifera*:

	<i>Anærophytic.</i>	<i>Schizosporangium.</i>	<i>Ærophytic.</i>
Ripe form	<i>Tilletia caries</i>	<i>Sporidesmium</i>	<i>Cladosporium</i>
Mould.....	<i>Oidium lactis</i>	<i>Mucor racemosus</i>	<i>Penicillium</i> crustaceum

I have taken warning from the numerous disappointments of microscopists, whose spores and germs of disease have sprouted luxuriantly for a while in popular reputation, but have had a mushroom duration, only in the annals of science. I am aware that the micrococcus and torula forms of fungi, alike in all, give no evidence of their nature and origin, and that all that can be said respecting those I have had

under my observation is, that it is possible that these germs, developing luxuriantly in the bile and voided with the feces, may be the source of the contagion which proves so fatal in the western pastures where Texas cattle have occupied them in advance of native herds. Whatever may be the bearing of these researches upon the etiology of the disease, they have an abstract interest and value independently of their practical application.

The fungus origin of zymotic diseases is now conceded by the highest authorities in mycological research, and the Texas fever is one which points with unusual clearness to this mode of propagation. That Texas cattle should communicate the disease while in a state of apparent health, and that Northern cattle dying from the virulence of the infection should be, as a rule, incapable of communicating it, can be readily understood on the hypothesis that a definite stage or amount of development is required by the organic germs of the contagion before they become capable of giving off the infectious spores by which it is propagated. The history of yellow fever shows how complete may be the immunity acquired by acclimation against a virulent form of contagion; and if the disease we have been studying were denominated "bovine yellow fever," no fault could be found with the designation. It is now admitted that persons in apparent health may convey the germs of cholera Asiatica from an infected district, their excreta undergoing a kind of fermentation through the multiplication of fungus germs, rendering them highly infectious.

According to recent researches, the different stages in the development of the same fungus possess very different properties and react very differently upon the human system. Thus the best authorities assert that *achorion schoenleini*, which is known to be the cause of *herpes circinatus* and of favus, as I have proved also by my own experiments, is but an oidium form of the same plant, which gives origin to *penicillium crustaceum*. If so, what limit can be set to the morbid capabilities of the commonest species of fungus? Their capacity for mischief must be as varied as the conditions of their development. So pliable are these low forms of vegetable life, that their injurious influence upon the human system, and upon the animal organism, need not be sought in their specific character, but may be ascribed to a virulence acquired by the circumstances, conditions, directions and degree of their development. This fact has received ample illustration by the researches of Prof. Hallier upon the fungi attendant upon the exanthemata.

In the hottest period of summer, when the liver is excited to unusual activity, cases presenting many of the features of the Texas disease in cattle are not infrequent in man. They present the same fatty degeneration and box-wood discoloration of the liver, the hemorrhages into the stomach and intestines, albumenuria and fatty degeneration of the kidneys, intense jaundice, yellow, grumous, but usually scanty biliary secretion, high fever, softening of the spleen; all these characteristics without the suspicion of yellow fever infection. In some of these causes disorder of the liver is the only recognizable cause of a train of symptoms ending in black vomit and death; in others, Bright's disease of the kidneys is the basis upon which these symptoms are engrafted. In these cases and in yellow fever, an acute cholæmia or admixture of bile with the blood is the most decided of all the pathological phenomena. The group of symptoms and lesions in the Texas disease is therefore well established, and corresponds to the action of a not unusual combination of causes, as well as to that of the yellow fever miasm. The application of the term *yellow fever* to the Texas disease of cattle, is warranted both by its pathological characteristics, and by the source of the contagion. From examination of the liver of yellow fever, I am confident that the same injection of the biliary radicles would be found as in the Texas disease, could the liver of the former be obtained under the same conditions that revealed that structure in the latter.

The pathological alteration in the liver of yellow fever is not a fatty degeneration merely, as is often asserted. The box-wood color can be derived from the biliary secretion only, and the liver of the Texas disease, and that of yellow fever, present precisely the same appearance when examined a number of hours after

death. The yellow coloration in the Texas disease is undoubtedly due to an admixture of blood with the bile at its source, or to a superabundance of hæmatoidine from broken down blood corpuscles in that secretion, and such may be considered the cause of the peculiar yellow coloration in whatever disease it may be found.

DESCRIPTION OF PLATES OF MICROSCOPIC ANATOMY.

PLATE No. 1. *a a*, Normal blood-discs. *b b*, Shriveled and crenated blood corpuscles of the diseased blood. *c c*, Flocculi from liquor sanguinis. *d*, A crystal of cholesterine (?) from serum. (1,000 diameters.)

PLATE No. 2. Bile. *a a*, Yellow granular flocculi of bile. *b*, A cast of a branch of hepatic duct. *c c*, Crystals of hæmatoidine. (500 diameters.)

PLATE No. 3. Urine. *a a*, Casts of tubuli uriniferi, consisting of coagulated blood. *b*, Element of epithelium. *c c*, Blood-discs. (500 diameters.)

PLATE No. 4. Section of the liver. (50 diameters.) *a a*, Yellow translucent center of acini. *b b*, An opaque zone of mingled fatty degeneration and yellow discoloration. *c*, Capsule of Glisson between acini.

PLATE No. 4½. Appearance of a fragment of liver. *a a*, Portions of reticulum of bile ducts. *b b*, Hepatic cells, filled with granules of fat. (400 diameters.)

PLATE No. 5. Reticulum of bile ducts within an acinus injected with the yellow tenacious bile peculiar to the disease. *a*, Reticulum. *b b*, Hepatic cells containing globules of fat. *c*, A separate hepatic cell with its portions of reticulum. (500 diameters.)

PLATE No. 6. Liver cells several hours after death. The coloring matter has passed from the reticulum into the cells. *a*, Nuclei. *b*, Globules of fat. (1,000 diameters.)

PLATE No. 7. Kidney. *a a*, Tubuli uriniferi of kidney (their epithelium filled with granules of fat), containing extravasated blood. *b*, Fragment of epithelium.

PLATE No. 8. Spleen cells and nuclei of splenic pulp. *a*, Normal element of nuclear epithelium. *b b*, The same enlarged, their nuclei filled with granules of fat. *c c*, Cells containing colored corpuscles, like blood-discs. (1,000 diameters.)

PLATE No. 9. Elements of splenic pulp during convalescence. The cells are regaining their natural size. *a a*, Homogeneous yellow granules. *b b*, Aggregations of the same. *c*, A muscular fiber-cell. *d*, Element of nuclear epithelium regaining its normal size. *e*, Element of epithelium filled with granules of fat. *f*, Blood-discs. (1,000 diameters.)

PLATE No. 10. Micrococcus found in bile and blood. 1. Appearance in fresh bile. 2, 3 and 4. Development of No. 1 in bile. 6. A variety of cryptococcus containing crimson granules from bile. 5, 7 and 11. Development of cryptococcus planted on a slice of apple; formation of filaments. (1,500 diameters.)

PLATE No. 11. *a a*, Cryptococcus guttulatus from intestine of rabbit. *b b*, Development of the same when planted on a slice of apple. (1,500 diameters.)

PLATE No. 12. Development of cryptococcus from bile on a slice of apple. Penicillium. (1,500 diameters.)

PLATE No. 13. Crystals of hæmatoidine from diseased kidney—the same existed in extravasations of blood into the cellular tissue surrounding the kidney. (1,000 diameters.)

[NOTE.—The interest that has been awakened by the announcement of the first results reached in this line of investigation by Dr. Stiles, is reasonable, and the importance of the ultimate truths and results to which it relates, warrants the continuance of this investigation. The following communications which Prof. Hallier sends to us from Jena, present the first results he has reached, and fully substantiate the conclusions previously reached by Dr. Stiles. As such elements of useful knowledge grow best by accretion and criticism, none of them should be withheld from publication. The lithographed figures upon the opposite page are *fac similes* of Prof. Hallier's penciled sketches. In the course of correspondence, this renowned mycologist of the University of Jena, Prof. Hallier, early in October last, made the following statement to us:

* * * I scarcely know of any body whom I might entrust with scrutinies of such importance as those mentioned in your letter. * * * The method of cultivating these small plants, I discovered, by very hard work, by a great number of researches continued through years, and now I believe myself able to discover the origin of every vegetable cell found in the human or animal body. * * *

If you can send to me bile and blood of the infected cattle, *I hope I shall be able to find out the origin of the cryptococci or micrococci.* * * *

With my best regards, most truly yours,

(Signed)

E. HALLIER.

In his second communication, Prof. Hallier writes as follows:

JENA, December 5th, 1868.

To ELISHA HARRIS, M. D., etc., etc.:

Sir: I am very greatly indebted to you for sending to me a vial filled with bile of the infected cattle. I received it safely on the 22d of last month. I immediately examined the contents of the vial, and found two different kinds of vegetable cells.

(1.) Micrococcus (of some kind of fungus) in large masses, many of them single and globular (a), others single and long shaped (b), forming mycothrix chains (mycothrix ketten), others in a state of division (c), and sometimes forming large or small colonies (d), (micrococcus kolonin).

(2.) Cells of much larger dimensions, and of the shape of cryptococcus, or rather intermediate between cryptococcus and arthrocooccus, most of them sprouting like true cryptococcus, but sometimes dividing and forming two equal limbs.

After this examination, I began a series of cultivations with the vegetable (micrococcus) cells.

(1.) Cultivation upon an object glass (without a covering glass). The food provided for the fungus was composed of boiled spring water, a portion of starch, sugar, and an equal portion of phosphate of ammonium (phosphorsäure ammoniak). The object glass was put into a culture apparatus (Hallier, Gährungserscheinungen, p. 13, fig. 3). In this apparatus in my room, at a temperature of 20° centigrade,* the micrococcus was in rapid augmentation on the 24th of November.†

The micrococci were swelling and forming the larger cryptococcus-like cells. In the first days of December, many of the larger cells germinated and formed long filaments with many branches, and of a brownish color.

Similar results I have obtained in other cultivations.

(2.) Cultivation on a lemon (deprived of its shell) in a similar apparatus.

The micrococcus forms large cells in the same manner as in the first cultivation (December 3d).

On many spots the micrococcus is augmenting to such a degree as to form large colonies. Near the outline of these lobular colonies the micrococci swell and become large cells of the same kind. In a few days the colonies only consist of these cryptococcus-like cells. These colonies become rather hard, and at last have a diameter of 0.001 m.—0.002 m. They are of a white color, and have the appearance, and, according to my opinion, even the function of a *sclerotium*. As soon as the *sclerotium* is formed, all the cells in it germinate in the same manner as the single cells. Of course they form great masses of filaments, or rather forests of filaments, as seen in figure 7, with a low power of the microscope. The filaments are of the same size and shape as in the first cultivation. In the midst of the little forest they form much larger cells, or rather fruits of that kind, which I called "Schizosporangia," divided by sheets‡ in one, two or three directions.

As you may see by looking at these few figures (No. 8), the shape of the schizosporangia is very various. The schizosporangia have the utmost resemblance to those whose micrococcus I discovered in the blood of the glanders of horses, and also in syphilis. Only look at the figures Nos. 11, 18 and 21.§

* 68° Fahrenheit scale.—E. H.

† The second day after Prof. Hallier's reception of this specimen from New York.

‡ Partition faces.

§ These numbers (11, 18 and 21), and also 23, refer to the microphyte forms derived from the horse's blood in glanders.

On the upper surface of the sclerotia are forests of filaments, and these filaments never form schizosporangia, but a cladosporium fruit (see No. 9), also similar to a correspondent form of the glanders and syphilis fungus. As soon as the soil begins fermentation, the cladosporium branches alter and take the form of the same penicillium, which I met with in the syphilis exploration (Figs. 12 and 13). It is possible that our fungus is no other than the "coniothecium syphiliticum," whose origin till now is unknown. * * * We wait for the conclusion of the different cultivations. These are:

(3.) Cultivation on the surface of a cork, disinfected by submersion in alcohol for an hour. Till now the result is the formation of the same sclerotia, and just now the cells of them begin to germinate.

(4.) Cultivation on the surface of a potato (the skin cut off). Till now only vast augmentation of the micrococci.

(5.) Cultivation in a solution of sugar and phosphate of ammonium. (The apparatus I have not yet opened.)

(6.) Cultivation on albumen of eggs, with a small portion of sugar solution. Great apparatus (greater isolation apparatus). [Gahrungsercheinungen, p. 14, Fig. 2.] This cultivation has the purpose of discovering the *brand* form (anærophytische morphe*) of the fungus, and may require two months' time.

I have already succeeded in discovering three forms of the fungus:

1. Schizosporangium.
2. Ærophytic spores (ripe), mature.
3. Ærophytic spores (unripe), immature or "mold" form.

There still must be discovered three other forms:

1. The unripe form of the schizosporangia (mucor or mold).
2. The anærophytic spores (ripe).
3. The anærophytic spores (unripe), oidium form.

As soon as I succeed in getting any more results I shall write to you. I hope you still succeed in getting the same forms in your cultivations. * * *

With my best regards, most faithfully yours,

(Signed)

ERNST HALLIER.

Manifestly it is not a common and familiar form of *oidium* or *penicillium* that Dr. Stiles and Prof. Hallier have been studying, or they would quickly have recognized and named these beautiful fungi. The fact is instructive, that in the cool weather of October we were able to send a specimen of the infected bile from New York to Jena, four thousand miles, without change, and with the spores alive, and evincing all the capabilities of higher development into plant-like forms.

It is not the present habit of science to depend upon hypothesis, because true knowledge patiently awaits demonstration and absolute facts; but every reader of Prof. Hallier's letter and Dr. Stiles' report concerning this parasite will not fail to remark how persistent and enduring is its own vitality. It survives and flourishes for months after being taken from the gall bladder and the blood of the infected bullock; and there is reason to believe that it would live and grow in muddy streams on various kinds of algæ. It is certainly an interesting and suggestive fact that, so far as the researches of Dr. Stiles and Prof. Hallier have extended (to date of this report), the type of fungus which they have found developed from these spores is one that finds its home in the carex, the lolium, and the wheatlike or *tilletia* grasses. Whatever results may be attained in the researches now in progress, including the examination of grasses, the cultivation of the fungus upon them and in fluids, as well as the study of the *development* of the fungus in its several stages, will be equally interesting to herd-farmers and to hygienists. The results, whatever they may be, shall be given to the public through the proper channels. E. H.]

[NOTE.—After the manuscript for this report had been delivered to the Board of Health and arranged for the printer, the following communication was received January 11th from Prof. Hallier:

* Anærophytic form or mode.—E. H.

JENA, December 18th, 1868.

DEAR SIR—To-day I can give you the results of my cultivations of the fungus which you sent to me. As I mentioned in my last letter to you, the fungus of which the micrococci and the cryptococcus-like cells take their origin, is a species of the genus coniothecium. This form of coniothecium is the true *brand* form (anerophytische morphe) of the fungus, growing only in the interior of the strata, or at least not under the influence of the open air. You get it best by cultivating the bile on a lemon deprived of the exterior portion of the pericardium.

The germinating cells of the fungus form, on most parts of the lemon covering, the penicillium form of which resembles very much the penicillium syphiliticum. On the dryer spots of the lemon you will see filthy masses of a dark greenish color. If you put these masses upon the object-glass, and put a drop of caustic potassa to it, you will very clearly see the coniothecium fruits surrounded by many filaments of ripe cladosporium with long spore chains.

Upon dry vegetable matters, like disinfected cork or potatoes, I have seen the cells of the fungus (spores) germinating in the same manner as on the lemon; but instead of the coniothecium (in every one of my cultivations of these spores), the filaments bore the true schizosporangia of which the following figures give you an idea.* The schizosporangia are formed on the ends of branches, not interstitial like coniothecium. The fruits are of very different forms, and of a dark brown color; they are scarcely to be seen by the naked eye, but with a lens you see black spots on the cork or potato, and these spots are covered with fruit-bearing filaments. On the potato the schizosporangia occasionally do not ripen, and in this case, if the potato is moist, the unripe or mucor-form appears. (See c, c.)

Notwithstanding the great similarity of the coniothecium syphiliticum and the species here described, they are entirely different. I tried to cultivate the syphilitis fungus at the same time (on the same days that I was cultivating the spores from diseased cattle), and upon the same substances, but never got the schizosporangia under the same circumstances as those observed in the cultivation of the fungus from the infected cattle in America. Our coniothecium from the bile of the infected animals was unknown till now, and for this reason, allow me to give it the name of Coniothecium Stilesianum, in honor of the first discovery of the parasite vegetable-cells in the blood and bile of the infected cattle.

Of this coniothecium, we have now succeeded in getting all the ripe (mature) and unripe (immature) forms.

1. Type-form (anerophytic spores [ripe] Coniothecium Stilesianum† [unripe] Oidium-like filaments.‡

2. Schizosporangia (Septosporium, according to the ancient system) Mucor Coniothecii Stilesianum.

3. Aerophytic form: [ripe], Cladosporium; [unripe], Oidium like filaments (according to the system, Coniothecium Stilesianum).

Perhaps you may succeed in finding out the places where this coniothecium grows in nature. At all events, it is a parasitical fungus, growing on plants, and to be looked for in the food of the wild bullocks. I began a new series of cultivation a few days ago, and if the results in any point are different from the first cultivations, I shall write to you another time about this matter. With my best compliments to Prof. Stiles, I remain

Most respectfully yours,

ERNST HALLIER.

DR. E. HARRIS.

VI.

PROF. CHANDLER'S REPORT UPON HIS CHEMICAL INVESTIGATIONS.

SCHOOL OF MINES, COLUMBIA COLLEGE, }
NEW YORK, December 1st, 1868. }

To E. HARRIS, M. D.:

Dear Sir—I have the honor to report, herewith, the results of my investigation of the blood, bile, etc., of diseased cattle, which you have sent to me from time to time. The analyses are as accurate as can be expected of such complex and putrescent fluids, during the warm summer months. The first samples spoiled on our hands, so that the analyses could not be completed.

I avail myself of this opportunity to call your attention to the valuable services of my assistants, Dr. Paul Schwitzer, Mr. F. A. Cains and M. D. Wheeler, Jr., A. M., E. M., who have been my co-laborers in this investigation.

Respectfully yours,

C. F. CHANDLER, Ph. D.

* See Plate 33, Figs. 4 (b), 7, 12 and 13.

† See Plate 33, Figs. 4 (b), 7, 12 and 13.

‡ See Plate 33, Fig. 4 (a).

Tabulated results of the Chemical Analysis of Blood of Bullocks.—By PROF. CHANDLER.

DATE.	Special records of the bullocks.	Water.	Solids.	Fibrin.	Red Cor- puscles.	Albu- men.	Fat.	Extrac- tive mat- ters.	Salts.	Total.
(1) August 17,	Convalescent of J. T. Alexander's; killed on the 8th day of convalescence; had been sick longest and most severely of any of the 5 convalescents.....	854.6	134.1	10.90	41.6	68.0	4.00	7.6	5.6	92.9
August 28,	Convalescent 15 or 16 days; from Mr. Alexander's herd, Communi- cated from a cervical vein, taken 4 days before slaughter; from Mr. Piles' herd.....	816.3	133.7	2.43	98.3	56.8	0.80	14.6	9.7	100.0
August 30,	Second specimen from same animal.....	887.2	142.8	6.90	50.7	63.8	.....	73.4	6.9	100.0
August 30,	From infected bullock at rendering dock.....	864.7	135.3	7.22	60.1	63.0	.....	72.9	3.1	100.0
September 4,	Blood taken at slaughter of No. 3, above; specimen from the aorta, - Bright & Fagan's Ill. herd; killed in last stage.....	856.9	111.1	5.60	60.7	64.9	3.10	6.9	6.8	100.0
September 9,	Bright & Fagan's Ill. herd; killed in last stage.....	849.5	147.9	5.50	7.8	120.0	1.00	1.3	8.2	100.0
September 10,	Bright & Fagan's Ill. herd; killed in last stage.....	810.5	130.5	13.10	.....	176.7	.....	9.4	11.6	100.0
September 11,	Bright & Fagan's Illinois herd; slaughtered in last stage; tempera- ture in centre of liver, 108°.....	876.9	123.1	7.80	13.6	60.8	0.60	26.2	14.1	100.0
September 13,	From "Fab-Kee" herd; killed in last stage; fat.....	784.0	216.0	7.50	22.4	138.0	1.20	19.0	8.5	100.0
September 14,	B. & F. Ill. herd; killed in last stage, temp. 108°.....	839.1	160.9	2.18	42.8	90.2	trace	5.2	6.7	100.0
September 24,	Steer from D. Adler's Ill. herd; killed in last stage.....	816.7	163.3	9.68	97.3	65.1	.....	5.2	7.8	100.8
October 11,	Mr. Richardson's ox; Lafayette Ind.; sec pt. 23.....	866.1	130.9	6.27	.....	169.8	.....	4.9	8.6	100.5
October 15,	Abandoned from Illinois herd; killed in last stage.....	870.1	125.9	7.44	56.2	36.2	.....	4.7	9.1	100.7
<i>Analysis of the blood of three healthy bullocks, by the same method and the same chemist.</i>										
December 18,	Bullock from Connecticut; fat.....	779.25	220.75	6.47	139.14	62.90	.....	4.23	8.01	100.0
December 19,	Bullock from Connecticut; very large.....	787.82	215.16	6.64	114.70	73.84	.....	6.22	8.68	100.0
December 20,	Bullock from Kentucky; fat.....	779.50	220.94	4.39	146.50	60.02	.....	3.02	7.01	100.0

* Putrid before it could be weighed.

Serum from Abdominal Cavity.

DATE.	Water.	Solids.	Fibrin.	Blood Cor- puscles.	Albu- men.	Fat.	Extract- ive mat- ter.	Salts.	Total.
August 30,.....	940.8	59.2	7.7	.....	40.6	.....	3.1	7.8	1000.0
September 4,.....	963.8	36.2	.....	.....	27.9	.....	5.9	2.0	1000.0
September 8,.....	787.7	229.9	10.7	21.9	157.6	0.6	.....	39.1	1007.6
October 11,.....	815.6	184.4	9.3	.....	168.6	.....	4.4	7.4	1006.4

The Bile.

DATE.	Water.	Solids.	Specific gravity.	Fats.	Mucous.	Cholates etc.	Salts.	Total.
August 26,.....	928.7	71.3	.....	2.15	6.37	62.8	.....	1000
September 4,.....	911.9	58.1	.....	2.44	1.51	54.1	.....	1000
September 4,.....	920.2	79.8	.....	.....	.....	.....	11.40	1000
September 9,.....	915.5	80.5	.....	3.16	11.10	66.2	.....	1000
September 11,.....	944.8	55.2	1016.0	.....	.....	.....	9.66	1000
September 14,.....	886.9	113.1	.....	1.04	17.05	94.9	.....	1000
September 25,.....	865.4	134.6	1030.5	.....	.....	.....	14.70	1000
October 1,.....	883.5	116.5	1043.4	.....	.....	.....	13.10	1000
October 12,.....	842.1	157.9	1053.6	.....	.....	.....	13.70	1000

The Urine.

DATE.	Water.	Solids.	Specific gravity.	Albu- men.	Salts.	Bile.	Reaction.	Total.
.....	.....	.....	1028.0	none	.....	none	.....	1000
September 9,.....	832.5	67.5	1027.0	42.90	5.9	none	alkaline	1000
September 11,.....	874.5	25.5	1014.0	7.80	2.7	none	alkaline	1000
October 11,.....	853.5	46.5	1030.1	0.06	0.7	none	.....	1000

The Liver.

DATE.	Water.	Solids.	Fat.	Salts.	Total.	Remarks.
October 11,.....	750.5	259.5	62.5	41.1	1000	.....
October 11,.....	766.8	233.2	66.1	.....	1000	Large lobe.
October 11,.....	773.1	226.9	90.1	.....	1000	Small lobe.
October 23,.....	707.1	292.9	88.6	.....	1000	.....

VII.**TITLES AND DESCRIPTION OF PLATES.****PLATE I.**

Appearance of animals in the acute or obvious stage of the Texas cattle disease.

Fig. 1. Showing the feeble animal supporting himself by locking his horns in a fence; back arched, hind legs wide apart, throwing the weight of the body forward, tail retracted, and ears drooping.

Figs. 2 and 3. Showing the drooping head, protruded tongue, arched back and yielding hind quarters.

Fig. 4. The fallen animal in the last stages of the disease preventing himself from rolling on his side, by twisting his head spasmodically in the opposite direction.

PLATE II.

Carcass of a bullock in the last stage of the Texas cattle disease laid open, in order to show the color of the muscular and adipose tissues. [This is a sketch of one of Mr. Thomas' herd from Indiana.]

PLATE III.

Sections of mucous membrane of abomasum, showing ulceration and intense congestion.

Fig. 1. Pyloric portion of abomasum, showing erosions of the surface covered with blood, blackened by the action of the secretions of the stomach.

Fig. 2. Section of a folding portion of another rennet stomach, showing a more chronic ulceration, and a higher grade of surrounding inflammation.

Fig. 3. Folding portion of abomasum, showing chronic erosions and intense congestion.

These three figures are taken from Texas cattle.

PLATE IV.

Omasum and abomasum, showing slight congestion of the layers of the former, and intense inflammation of the folds of the latter.

a, Omasum; *b*, layers or maniplies; *c*, abomasum; *d*, small intestine.

PLATE V.

Pyloric portion of abomasum, and commencement of small intestine, showing inflammation and ulceration of mucous membrane of the former.

PLATE VI.

Sections of pyloric portion of abomasum, showing congestion and ulceration.

PLATE VII.

The fourth stomach, showing congestion and deep blackened erosions.

PLATE VIII.

Accidental ulcer of upper lip and portion of rectum.

Fig. 1. *a*, Ulcer of upper lip; *b*, *b*, *rami* of lower jaw.

Fig. 2. *a*, Mucous membrane of rectum, its longitudinal folds inflamed and covered with minute extravasations; *b b*, adipose tissue.

PLATE IX.

Mucous membrane of cæcum and sections of abomasum showing hypertrophy of the follicles.

Fig. 1. Mucous membrane of cæcum, presenting patches and striations of congestion and extravasation of blood.

Figs. 2 and 3. Sections of mucous membrane of folds of abomasum showing the closed follicles enlarged and prominent on a surface of congestion.

PLATE X.

Bladder everted, mucous membrane covered with petechiæ and extravasations.

a, Urethral portion inflamed and œdematous; *b*, fundus marked by deeper congestion and larger extravasations.

PLATE XI.

Sections of inflamed duodenum and rectum.

Fig. 1. Mucous membrane of duodenum intensely congested and œdematous.

Fig. 2. Mucous membrane of rectum intensely inflamed, its longitudinal rugæ œdematous commencing gangrene.

PLATE XII.

Sections of mucous membrane of abomasum inflamed, and recovering from sloughs, etc.

Fig. 1. Mucous membrane inflamed and covered with blood that has been extravasated upon the surface, and blackened by the gastric secretions.

Fig. 2. Mucous membrane of a Texan highly inflamed, the edges of its folds sloughed and thickened.

PLATE XIII.

Pyloric portion of abomasum showing extensive slough.

PLATE XIV.

Sections of mucous membrane of ileum, showing congestion of longitudinal and transverse folds.

PLATE XV.

Mucous membrane of omasum, abomasum and bladder; intense congestion and petechial extravasation.

Fig. 1. Mucous membrane of omasum, with ecchymosis and papillary projections.

Figs. 2, 3 and 4. Mucous membrane of small intestine reddened by congestion.

Fig. 5. Bladder in miniature, showing petechiae on a ground of diffused congestion and extravasation. *a*, Urethra.

Fig. 6. Mucous membrane of No. 5, on natural scale, appearance of petechiae.

PLATE XVI.

Posterior surface of liver and gall bladder (reduced in size), showing distended gall bladder.

PLATE XVII.

Appearance of enlarged and distorted liver; diaphragmatic surface (weight 23 pounds).

a, Section showing color of parenchyma immediately upon being cut.

PLATE XVIII.

Spleen entire, reduced and sections.

Fig. 1. Spleen (reduced) showing the mottled greenish color of the peritoneal surface.

Fig. 2. Section of spleen (natural scale) and actual appearance of the surface.

Fig. 3. Portion of spleen of another animal, showing congestion of capsule, and gashed to show the pulp.

PLATE XIX.

Kidney laid open, in order to disclose the interior congestion and discoloration, and showing cortical portion, tubular portion and pelvis with surrounding fat; all these parts blackened and intense congestion.

PLATE XX.

Kidneys entire (reduced) in different stages of congestion.

Fig. 1. Same animal as Plate XVII.

PLATE XXI.

Section of pyloric portion of abomasum, several weeks convalescent, and of rectum, showing congestion and ulceration.

PLATE XXII.

A congested and ulcerated abomasum.

PLATE XXIII.

Sections of skin, liver and spleen.

Fig. 1. Portion of skin shaved, in order to show its jaundiced hue.

Fig. 2. Fragment of liver showing color of surface, and the ramifications of the distended biliary ducts.

Fig. 3. Portion of spleen showing congestion of superficial blood vessels and coloration of parenchyma.

Plates illustrating the microscopical researches, seven in number, already described. Plate XXXII illustrates Prof. Haller's study of the fungus parasite of the blood and bile in the cattle disease.

VIII.

WITH WHAT WELL DESCRIBED DISEASES IS THIS TEXAS CATTLE DISEASE ALLIED?

Having alluded to the fact that the first groups of the diseased animals that arrived at the metropolitan herd-yards exhibited symptoms which led us to believe that the malady perhaps belonged to the brood of contagions known as *anthrax* fevers, some pains have been taken to inquire carefully into its chief points of resemblance and difference, compared with those fevers, and with the milzbrand and kindred disorders which prevail on the continent of Europe.

The very first dissections that were made clearly demonstrated that it was not the intestinal typhus, for the small intestines were in no cases marked by any of the lesions of typhoid enteritis which is prevalent in the lowlands of Holland, Belgium and Hungary. Considered in regard to all the phenomena and pathological changes noticed in the first two groups of diseased cattle, this disease seemed to require a description that had hitherto not been given in any treatise on epizootics. From the Western newspapers the fact was learned that Prof. Gamgee and others regarded it as similar to the "darn" of Aberdeenshire. Prof. Liautard, with whom we frequently conferred during the autumn, did not attempt to give any name to the disease. The same was true of Prof. James Law, the accomplished professor of veterinary science at the Cornell University, Ithaca, N. Y., whose attendance we had the good fortune to secure at one of the last post-mortem examinations made at the national drove yards, One Hundreth street. The latter gentleman has, with characteristic thoughtfulness, kindly forwarded to us the subjoined communication relating to the points we are here examining:

* * The "darn," as seen by us in Great Britain (Prof. Law is a native of Scotland), is usually a very mild affection. Its cause is agreed on all hands to be the ingestion of irritant, resinous and astringent plants, as its common names—in England, *wood-evil*; in Germany, *holzkrankheit*; and in France, *maladie de bois*—would indicate. The symptoms are those of intestinal irritation, the colicky pains being often severe, with constipation; the feces, if passed, being coated with mucus or even blood, and in bad cases forming a tarry mass evidently due to altered and effused blood. The urine, red or black, contains large quantities of blood-coloring matter and albumen.

If seen in the early stages, measures directed to the obtaining of free evacuations from the bowels are almost always followed by a speedy restoration to health, so that I have never seen a fatal case.

It is worthy of note, that it often prevails on the same lands with the *anthrax* or *carbuncular* affections, and appears then to be complicated by this disease, or modified by a similar cause. Roll, of Vienna, says there will sometimes appear "a gelatinous exudation into the sub-cutaneous areolar tissue, and extravasation beneath the serous membranes, showing a complication with anthrax. The malady begins with the appearance of gastro-enteritis, accompanied by renal irritation, scanty, red or bloody urine, great sensibility of the loins and intense fever, mucous and bloody feces, fetid and bitter milk, with not unfrequently spasms or convulsions. The complication with splenic apoplexy (milzbrand) is seen, and may be shown by swelling and emphysema on the surface of the body."

Hering and others speak in analogous terms, indicating its close connection with the anthrax affections, though whether only as a complication or a full development of the original affection, is open to question. Our English form rarely assumes this aggravated type, and seems quite wanting in the malignant properties of carbuncular fevers, having, moreover, no specific virus like these latter. I ought to add, however, that in those European cases that prove so fatal, the autopsy shows points of resemblance to the Texas fever. Hering says there is "inflammation and petechial patches in the stomach and intestines, the ingesta is dried, the mucous membrane cedematous, the liver and spleen enlarged, sometimes even to rupture; the gall bladder distended, the kidneys contracted, a turbid effusion in the thorax,

inflammation and petechiæ in the pulmonary organs, and a jelly-like effusion into the cellular tissue."

The accounts, however, are too meagre, and as you will notice, the means available in the present day have not been brought into requisition in the case of these diseases, so as to furnish data sufficiently numerous and accurate for comparison.

I have already mentioned to you the general similarity of the Texas fever and the *carbuncular fevers* of Europe. I mentioned that one great distinguishing feature of the former was the absence of *bacteria* in the blood, though as these have been found in the blood of animals suffering from influenza and other affections, attended with a typhus diathesis, their presence is probably not an essential condition of the disease. What leads me to make special reference to this again, is the statement by *Davaino*, in his communication read before the *Académie de Médecine* (July 27th, 1860), that in addition to bacteria, the blood of anthrax patients contained special globular elements. "Globules, of a peculiar kind, are sometimes found; they are regularly rounded off, and larger than the normal white globules, of which they have the appearance. They are united in small clusters in great abundance, and are composed of an outer cell of a bulbous appearance, reflecting in some a violet tint. In the center of this cell there are found several nuclei, the double outline of which is well marked. In some, these nuclei have degenerated into the sandy or granulous form, peculiar to the nuclei which are produced by *fission*, so that evidently we have under our eye an alteration of the elements, *which are in a fair way of multiplication*."

This spore cell production I had altogether overlooked; but now the question arises: May not this be the same microphyte as you have so admirably shown in the blood of *Texas fever*, or, what would probably amount to much the same thing, a fungus, which demands much the same condition of blood for its development? The want of any testimony to its presence in the bile, and the ignorance concerning the special action of the bile in breaking up the blood globules, affords no presumptive evidence of the non-existence of these conditions, since the presumption is that *no test was applied*.

In contagious properties, again, they agree in some remarkable points. The carbuncular fevers are inoculable, and usually contagious, but the contagium is rarely or never conveyed through any other medium than the blood, tissues and discharges of the diseased animals—rarely showing what the French call a *vivius volatil*—and evidently requiring some, not well defined conditions, for its transmission; hence, in many cases—indeed, the majority of cases in Great Britain—it gives no evidence of a *contagium* unless inoculation is resorted to.

With much esteem, yours very faithfully,

(Signed)

JAMES LAW.

To E. HARRIS, M. D., *Metropolitan Board of Health*.

Plainly enough, it will be easy for European medical observers of milzbrand, and the whole group of anthracoid diseases of cattle, to ascertain whether these destructive maladies which they witness are or are not similar to the Texas cattle disease. Prof. Virchow, of Berlin, Dr. William Budd, of Bristol, and the ablest pathologists in Europe, think they are able to trace a direct relation between carbuncular or anthracoid fevers of domestic cattle and the malignant pustule in man. Such a relation is now admitted to be the source of this terrible fatal malady. But in reference to the Texas cattle disease, the fact seems well established that it does not produce malignant pustule, and that while it corresponds with the destructive epizootic fevers which Professor Law has carefully described in the foregoing letter, it nevertheless seems to differ in some essential points from them. It is highly desirable that all the anthracic or carbuncular fevers should be studied with the same care and exactness as the Texas fever. Professor Law's statements concerning the actual analogy between the milzbrand, of Europe, and the Texas fever, are eminently suggestive; and we feel greatly obliged to that learned writer for this valuable contribution from his pen. It may yet be found that the marshes of Hungary and the swamps of the Vistula occasionally produce a disease quite similar to the Texas cattle fever.

IX.

FACTS AND DEMONSTRATIONS ADDED TO PHYSIOLOGICAL AND PATHOLOGICAL KNOWLEDGE.

FIRST. *The demonstration of the rapid dissolution of the red blood globules in the last stage of the disease and immediately after death.* This was plainly true in the first cases examined by Dr. Stiles; and on the 10th of August he remarked that after the blood, flowing from the carotids of infected bullocks, had stood for a few hours in stoppered vials, scarcely a trace of blood-globules could be found, excepting such broken and shrivelled as he has described in the first plate of his microscopy of the blood. And, while experimenting with a solution of the morbid bile from the same diseased bullocks, Dr. Stiles noticed the fact that the red globules of the blood were swept into solution almost as suddenly as snow flakes would be when falling into water.

SECOND. *Facts connected with the ultimate reticulum of biliary ducts and the morbid changes in the liver and bile.* The discovery that was made by Dr. Stiles (when working in the field with the microscope, on the 13th of August), of the reticulated structure and distribution of the ultimate biliary ducts of the liver, not only added a fact of great interest and importance in progressive physiological knowledge, but this discovery was from the first associated with pathological conditions, the later studies and better understanding of which have led to comprehensive, exact and highly important practical conclusions in regard to symptoms and pathological changes which had hitherto been most important, but at the same time most difficult, if not impossible, to understand. We refer to the mechanical and pathological conditions which in this disease manifestly produce cholemia, and to certain demonstrations here alluded to concerning the morbid condition and destructive effects of the bile as witnessed in this disease. The studies which Frerichs and other high authorities have given to this class of facts without such means of demonstrations, have been corroborated and placed upon a more definite practical footing by the results of these researches.

THIRD. *The demonstration of consecutive pathological changes, and of their relations to the fatal result.* No other pestilential or febrile disease, whether epidemic or epizootic, has furnished to medical observers such a complete and consecutive series of demonstrations of the steps by which disease progresses from its incubative beginnings to perilous and destructive changes in tissues and proximate elements to obvious symptoms and exclusive phenomena, until death terminates the pathological record of events. Considered with reference to the progress of medical knowledge and hygienic measures, in regard to epizootics and enzootics, as well as in regard to epidemics and certain of the spreading pestilences that depend upon contingent circumstances that hitherto have not been well demonstrated, the results reached in these investigations may justly be regarded as in the highest degree encouraging and instructive. The successful study of the essential morbid changes that occur during the progress of this disease in the blood, the bile, the liver, the most vascular and constricted portion of the stomach and the spleen, and lastly, the explosive phenomena, the destruction of the blood corpuscles, the waste of blood elements of the kidneys, and the morbid alterations that occur in those organs, and in conclusion, the phenomena and circumstances of death, together with that impressive and truth-telling signet which the damaged and broken blood corpuscles leave in the tissues, cavities and fluids into which the spoiled and stagnant blood has oozed and left crystals of hæmatoidine, singly, and in this association, constitute such a series of consecutive and well co-ordinated events in the disease as rarely has rewarded the toil of medical researches.* And notwithstanding

*The scientific papers of Dr. Thudichum in the Ninth and Tenth Annual Reports of the Privy Council (1867 and 1868), show that these researches into the nature and causes of morbid changes in the blood are of the very highest practical importance to the medical officer in dealing with the sources of preventable disease. Dr. Thudichum remarks that "the study of many diseases requires an intimate knowledge of the constitution of the blood corpuscles." He states, also, that "the hæma to crystalline is the last ingredient of the blood which undergoes putrefaction; its stability is the main fact in the stability of life."

ing more remains to be learned than all that hitherto has been demonstrated, it is certain that some substantial progress has been made in that kind of knowledge by which the mysteries of transportable pestilences will ere long be unmasked and exterminated or effectually controlled. And when we consider that, had it been a human pestilence, this disease could not have been studied in this manner without violating the common sentiment of regard for the dying and the dead, the medical men who pursue such investigations upon the food-animals, may justly claim that by such studies as these they confer a three-fold benefit upon mankind; for in addition to the protection of human foods and myriads of valuable cattle, a correct and controlling knowledge of human pestilences is promoted as it could be in no other way.

FOURTH. *The re-demonstration of the same law of ground-incubation, or development of a contagium deposited upon the soil from the bowels.* This very important law or truth concerning certain infective principles or substances was first demonstrated by Prof. Pettenkofer, of Munich; and the demonstration, as the Metropolitan Board of Health very well knows, related to the propagating principle of the Asiatic cholera. Dr. Wm. Cudd and Dr. Snow, in England, practically taught this doctrine, without full demonstrations, at the same time that Pettenkofer was tracing out the complete evidence upon which this law is now founded. As in regard to the infective cause of cholera, so in regard to the Texas cattle disease, the bowels of the living, and in some instances apparently healthy, individual *carrier* of the pestilential germs, may evacuate, with excrement, those germs so completely developed that they may at once begin the fatal and incubative work of infecting other individuals; or, on the other hand, the germ development in such excrement may be so incomplete or immature ("unripe," as Prof. Hallier says of the anaerophytic spores), that the surface of the soil, or the herbage on which the excrement is dropped, must serve as the nursery and "hot-bed" for nourishing them into the advanced or infective and poisonous stage of development (the "ripe" state, Prof. Hallier), before the blood and tissues of the exposed and healthy individuals can become infected. In the present state of advancing demonstrations in regard to the pestilential *contagium* of cholera, this would scarcely be regarded as theoretical language, much less does it now seem to be merely theoretical in regard to the Texas cattle disease. Upon this subject we need only refer to the abstract of correspondence and of authenticated evidence in preceding sections of this report. In the States of Illinois and Indiana, the proofs upon this point concerning the incubation or maturing of the excrement *contagium* during an interval of greater or less duration after it was dropped upon the ground, are so abundant and convincing, that many of the farmers seized upon the logical interpretation of their own peculiar experience and classes, and emphatically, though somewhat rudely, gave expression to this wonderful yet now easily understood doctrine, that Pettenkofer demonstrated when analyzing the history of cholera in Bavaria in the autumn of 1848. A vast quantity of evidence (experience and record) relating to this anomalous habit of the infective cause of the Texas cattle disease, is constantly coming into our hands, and it will in due time be analyzed and the results made public.

FIFTH. *Aid in elucidating important physiological and pathological questions connected with yellow fever.* While summing up and analyzing the results of these investigations concerning the "Texas cattle disease," we have been deeply interested in the contribution which these results make to practical knowledge of some of the most essential questions that have, in the past fifteen years, been started by physicians in the study of yellow fever. The compiler of this report having witnessed and professionally examined several hundred cases of this pestilence, and made dissections of nearly one hundred persons that died of it, was prepared to notice the points at which the results of the present investigations apply to the questions that have arisen in the study of yellow fever. In regard to these questions we will here notice the following points:

In 1853, Prof. Alonzo Clark, of New York, discovered and described the characteristics of the fatty change and the peculiar coloration that occur in the liver in cases of yellow fever. He also described the nature and cause of the strange coloration

which characterizes the liver in malignant remittent fever. Dr. T. H. Bache and Dr. Stewardson, of Philadelphia, made similar researches and reached similar results. The microscopical investigations by Dr. Lyon in the last epidemic of yellow fever in Lisbon, and similar studies by Dr. S. Fleet Speir, of Brooklyn confirmed the medical opinion of the profession that the most constant of any of the anatomical changes in the latter malady is found in the liver, and in a certain kind of coloration which attends the malady as a resultant of the dissolution of blood globules. Whoever peruses this report, should, if possible, read the Prize Essay of Dr. Speir in the Transactions of the American Medical Association (vol. xv, 1864), and consult the letter from Prof. Clark in the first volume of Dr. La Roche, on yellow fever, and the report on yellow fever in Lisbon, in 1858, by Dr. Robert Lyon. These distinguished pathologists found that the pestilential destruction of blood globules, the presence of the resulting *hematoidine*, or of *hematine*, from which it is derived, and the acute fatty change in the ultimate structure of the liver, are the most essential pathological events in that malady. But the opportunity for studying the structural (morphological) alterations in the liver, the blood, the spleen and the kidneys, in fatal cases of yellow fever, have not given the facilities for precision in results of microscopical inquiry (because not made in every stage of the disease and of convalescence, and before any post-mortem change was possible) which have been afforded by the infected cattle for the examination of these vital structures. And it is one of the rewards of the latter class of labors that they elucidate and verify the chief deductions that have been made by the learned physicians whose researches in yellow fever are here mentioned.

In concluding this brief note upon the aid given to clearer demonstrations in pathology by these investigations, we would not omit to notice the very instructive researches of the late Dr. Daniel Blair, chief medical officer of the British military establishment in Demarara; for when he died in the midst of great efforts to discover the true cause of yellow fever, sanitary science lost its most ardent inquirer into the natural causes of this pestilence. The latest of his observations were so directly in the line of the demonstrations that have resulted from Dr. Stiles' investigations that we mention them in this place. Truly scientific physicians are jealous only for the truth; and it will be noticed that Dr. Blair reached the verge of that important discovery which Dr. Stiles has made in regard to the actual ultimate structure of the biliary system. It was in a living patient in his hospital, and in some vomited bilious and bloody matter which Dr. Blair believed contained by chance some particles from the diseased liver cells that had floated into the duodenum and into the stomach with the bile. In April, 1856, Dr. Blair wrote to his friend, Dr. John Davy, of London, as follows, concerning his microscopical examination of that fancied and but barely possible presence of debris of the liver:

"It (nitric acid, upon a certain specimen) enabled me to trace some of the tubules into the *center of the specimen*; still more important, it enabled me to detect within them liver-cells, with their minute oil globules. * * * I think there can be little doubt that these tubules are the *radical secreting ducts of the liver*. May not these observations throw some light upon what I believe is still an undecided point in anatomy, viz., the precise manner in which the radicals originate in the lobules? To me, what I have seen seems a demonstration of the induction of Kiernan on this point."

Dr. Blair was describing a substance that his patient had ejected with some bile or vomit, and this observation came near being buried with its author. It was not a demonstration; nor would a thousand such observations have been a worthy basis of belief or assertion; but it has value as an observation, that we mention this fact here, because it belongs to the record of a most important discovery and actual demonstration of essential facts in the anatomy and pathology of the liver, and particularly because this curious observation by Dr. Blair shows how difficult and obscure was the kind of knowledge which he sought by the bed of the dying and in the corpse of dead of yellow fever. (For a fuller account of Dr. Blair's latest observations, see his letters appended to the April and July numbers of the *Medico-Chirurgical Review*, 1856.)

X.

CONCLUSIONS.

The field in which the investigations have been commenced is too large to admit of final conclusions upon *all* the points of inquiry, in so brief a period, for analyzing the results of so numerous and varied an assemblage of facts. Our deductions, therefore, must be regarded rather as landmarks and soundings, than as boundary lines, upon the shore of great truths. The conclusions that appear best established have important relations to practical questions in hygiene and to the interests of herd farmers.

FIRST. *The nature and pathological effects of the disease in beef cattle.* The investigations prove that the disease is caused by a slowly incubating poison which operates in a fatal way upon the blood, and which also produces important structural alterations in the essential organization of the liver, the spleen and the kidneys.

SECOND. *The precise nature of the diseased structural alterations.* The blood suffers an impairment, and, in the fatal stage, an almost entire destruction of its most vital portion—the red globules. It also suffers in its natural quality and richness by the loss of albumen through the kidneys, and by other very serious kinds of impairment which are not yet understood, but which result in actual destruction of the blood as a living element of the animal system. This spoliation and death of the blood (*necræmia*) appears to be complete. No disease or poison known to medical men has ever presented a more striking example of an incubating blood poison (*toxæmia*), and an ultimate termination by *necræmia* or death of the blood.

The *anatomical lesions*, or structural alterations in the liver, are unquestionably the first in the order of beginning, and of relationship and importance. The particular kind of morbid conditions in the secreting and circulatory organism of the liver would inevitably contribute to the general and final destruction of the blood, and also would induce the morbid changes that are observed in the spleen. Physiological principles seem fully to account for the engorgement, erosion and sloughing which occur in the tubular portion of the fourth stomach or abomasum. The spleen, in its engorged, diseased condition, would necessarily aid in producing the stomach lesions (erosion and sloughing) by its own failure to furnish outlet and relief to the engorgement of the vessels of mucous membrane of the rennet, and it could contribute in several ways to hasten the final dissolution of the blood. The engorgement and the acute fatty degeneration or change noticed in the kidneys is one of the chief causes of the rapid waste of albumen from the blood; but the disease may, and not unfrequently does, go on to a fatal termination without being attended by any considerable amount of disease or change in the kidneys. The lesions or changes that have been observed in the other tissues and organs of the infected animals seem to be merely results of blood changes and impaired vitality. Those lesions which are merely incidental to the really essential changes in the blood and in the liver and spleen may, nevertheless, be recognized as aids in diagnosis of the disease in certain cases. They are, therefore, worthy of attention and description, such as we have attempted to give in several of the illustrations given in this report.

THIRD. *The parasite that is found in the blood and bile of infected cattle.* Whether we regard it as a propagating and destructive cause of the disease, or simply as a concomitant, it is necessarily an important attribute of the pathological or destructive agency that operates upon the blood. The prolific brooding and growth of the fungus (*micrococcus*) is wholly dependent upon the living elements of the blood for its "soil and food" to grow upon. But the real significance and value of the results that have been reached in the researches upon this collateral element of the inquiry into the disease, promise much for practical hygiene as well as for herd farming; for such complete demonstration will lead to a kind of absolute knowledge that is much needed concerning the pestilential epidemic, as well as the destructive epizootics, and will lead to their *entire prevention*.

FOURTH. *The unfitness of the dying and the infected cattle for human food.* If this question is raised by any persons, or on behalf of any commercial interest, it should at once be answered in general terms that both the animals that are dying, and those that have lingered under the operation of the infection until the blood and viscera are diseased, are unfit for food. Practically the human stomach can overcome most of the immediately poisonous effects of diseased flesh and animal juices used as food; but experience and teachings of physiology and hygiene unite in pronouncing unfit for food all the cattle that reach the fatal stage of the "Texas cattle disease," and all that have incubated the infection until the blood and tissues exhibit the morbid alterations which that poison produces. And as regards *certain freshly arrived Texas cattle* that are suffering the disease (as we now diagnose it by the *post-mortem* evidences in them when slaughtered, and by emaciation, feebleness, and their indescribably offensive breath and effluvium while living), we can best express the conclusion that has been reached by the more precise kind of investigation, without here mentioning the details of evidence on this subject, by simply quoting the remark of an educated observer of the Texas cattle disease in western Missouri. He says: "Who would knowingly eat the beef of cattle with such a pestiferous breath as these sick Texas cattle have? It can be no favor to the consumers of beef to have that article cheapened in the market by the introduction of animals of such very doubtful, not to say injurious, character." In plain words, cattle while suffering either from the chronic or the acute type of this disease ought to be withheld from the meat markets.

FIFTH. *The period or term of incubation.* The term of incubation or latent development of the fever poison in the second or northern groups of cattle that receive the infection, is clearly proved to be a period of variable duration, and that it varies from fourteen to thirty or forty days; but that, in the majority of instances, the full incubation and development of the disease is accomplished in about twenty days.* High temperature manifestly hastens the development of the disease, and the hunger, thirst and excitement of railway transportation aggravates it. But that, even where the cattle become infected in good pasture, and under circumstances that are favorable to the best health, the incubation is certain and destructive; and that with such conditions it requires four weeks, less or more, to bring the malady forward to its stage of obvious symptoms and death.

SIXTH. *The susceptibility of different kinds of cattle.* The fact seems well established that well bred and full fleshed cattle are extremely susceptible to the operation of the contagium, and that in them its highest rate of mortality is produced. The fact is also indisputable that in the herds that have the misfortune to bring the disease or *contagium* from Texas, only a small percentage become fatally sick; but in such herds many that do not die of the disease linger many weeks in an emaciated and diseased condition.

SEVENTH. *Acclimatization and insusceptibility to the cause of the disease.* This kind of security seems to be enjoyed only by cattle that have been bred or pastured south of the Osage and Arkansas rivers; but whether this partial security against the malady is due to the peculiarities of wild cattle, or to a gradually acquired physiological power to resist the fatal operation of the primary cause of the disease while grazing at its very sources, does not appear to be proved.

* This is a little more than four times the average and usual period of incubation of yellow fever in man. The troops that continued to be sent from France to the port of Vera Cruz during the recent occupation of Mexico by the French, were attacked by yellow fever under such exact conditions and periods of exposure by medical observation at the times of their arrival in port, that the medical officers had no difficulty in reaching the conclusion that the period of incubation of the infection (contagium) "was never less than forty-eight hours, and seldom more than four days." (Surgeon M. Croullebois on *Epidemic Yellow Fever at Vera Cruz* in 1863. *Recueil de Memoires de Medicine, de Chirurgie et de Pharmacie Militaire*, Paris, December, 1868.) This result of observations by the French military surgeons accords with observations upon the same pestilence in the harbor quarantine hospitals at New York, with this exception; that in *this latitude* we find that the period of incubation ranges from three to seven days, and that in cool weather the incubation term is longer than in very hot weather.

EIGHTH. *Is the disease due to crowding and abuse of cattle?* Plainly, it does not *originate* from such causes; but there is evidence that the Texas cattle that are crowded upon the "boiler deck" of the Mississippi steamboats, and subjected to thirst and fasting on the voyage up the river, have thus far been themselves the greatest sufferers by disease, and have proved to be the most frequent carriers of the cause which last summer destroyed native herds in Illinois and Indiana.

NINTH. *Susceptibility of other animals than those of the bovine species to the disease.* The fact seems to be well established that several kinds of herbivorous animals do suffer and die from the disease.

TENTH. *Is the disease of cryptogamic origin?* With the amount and kind of evidence now in our possession, it seems probable that this malady owes its origin to a species of fungus parasite which has now been demonstrated to infest infected cattle; and that this conclusion rests upon other and much stronger reasons than that such a parasite simply *is found* in the blood and bile. It also seems highly probable that the actual *contagium*, or means by which the disease is repropagated by cattle, will ultimately be demonstrated to depend upon this minute spore-growth (*micrococcus* matter of Professor Hallier), which is found in the diseased cattle and upon the higher stages of the development when deposited with the excremental droppings upon the soil, etc. And that ultimately it may, and probably will be discovered, that the native habitat and source of this parasite is in limited districts of country south of Missouri, Kansas and Arkansas; and that it is a parasite of the indigenous herbage of those districts. Upon all these points the evidence is cumulative, harmonious and logical; yet, in the more advanced state of knowledge concerning the causation of this and other infectious diseases, it may be found that this or some other essential attribute of the disease and the contagium is only an essential factor, the presence of which, with other morbid and unhealthful conditions, insures the production and fatal operations of the malady. Finally, in regard to this exact kind of discrimination concerning the nature and destructive operation of the propagating cause of pestilential diseases, the facts that have been demonstrated concerning the Texas cattle disease add very largely to a kind of knowledge which is of the highest importance to sanitary science and its protective applications in the human family and to the useful animals which the Creator has given to man.

E. HARRIS.

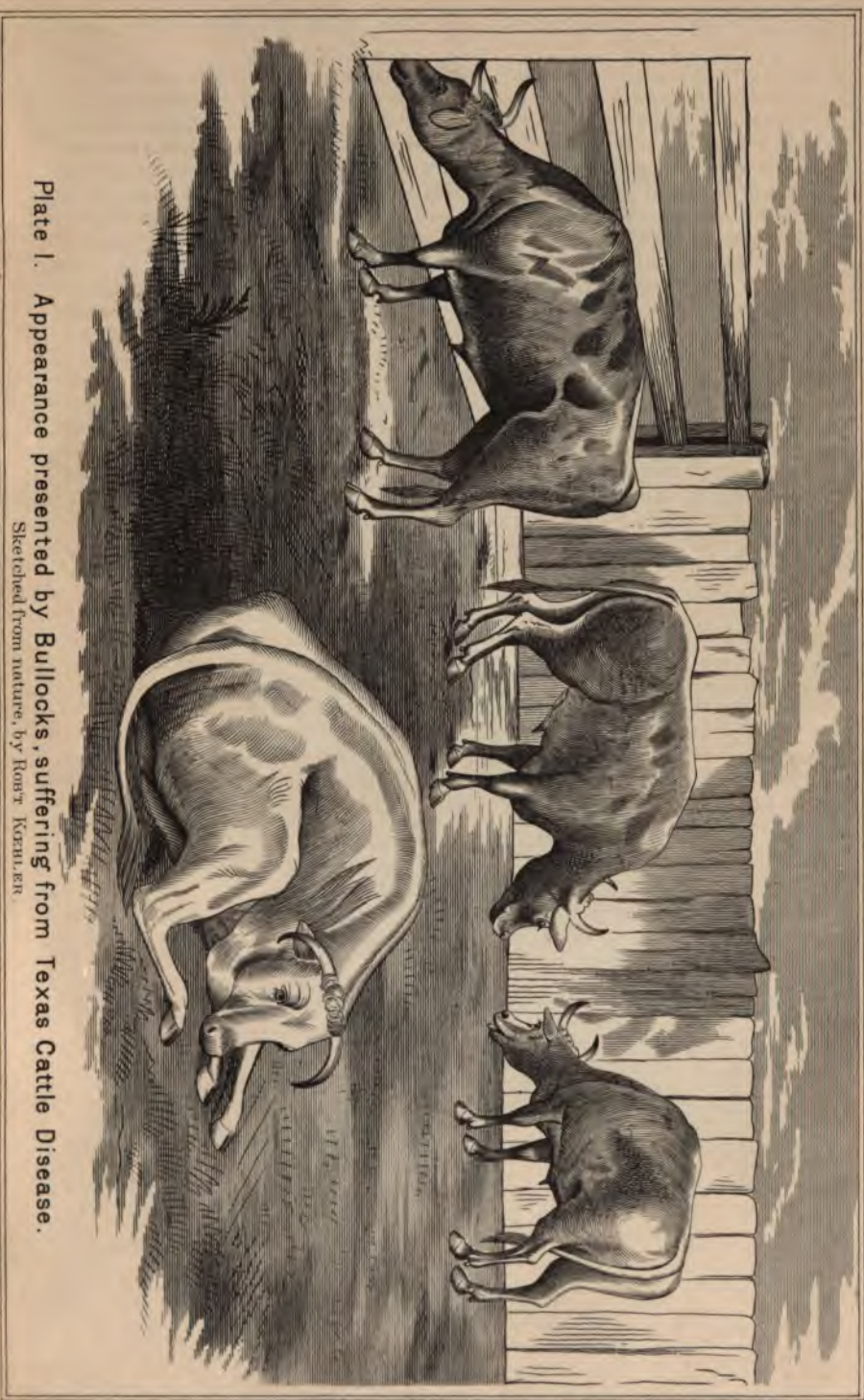


Plate I. Appearance presented by Bullocks, suffering from Texas Cattle Disease.

Sketched from nature, by ROBT. KEMBLER.

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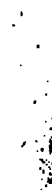
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Carcass of Bullock.
(killed in the last stage of the disease.)

1







Appearance of 3rd and 4th Stomachs,
in the beginning of the acute stage.

See plate I. Fig. 2.

day 6. cat.



Plate V
Pyloric portion of Abomasum



H. Kohler fecit

Reyes Co. Lith.



H. Koehler, fecit.

Artes Co Lith Albany N.Y.

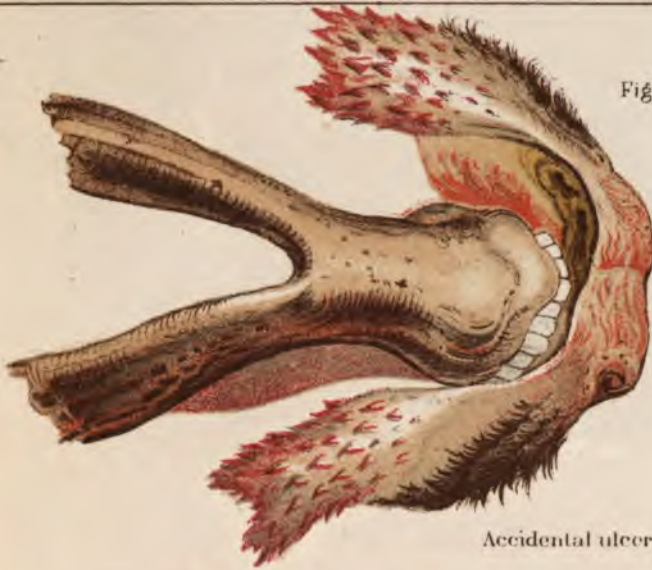
Sections of Abomasum,
showing congestion and sloughing

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Erosions in the Abomasum

Fig. 1.



Accidental ulcer on lip.

Fig. 2



Mucous membrane of rectum

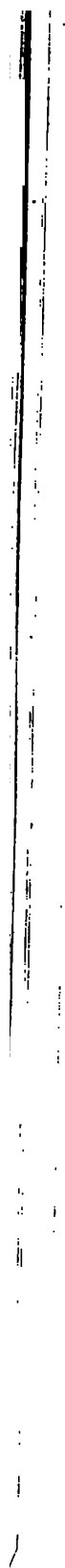
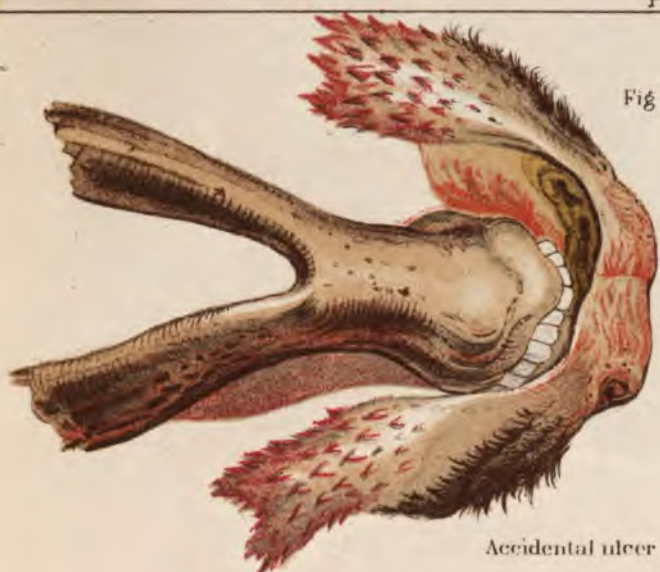


Fig. 1.



Accidental ulcer on lip.

Fig. 2.



Mucous membrane of rectum

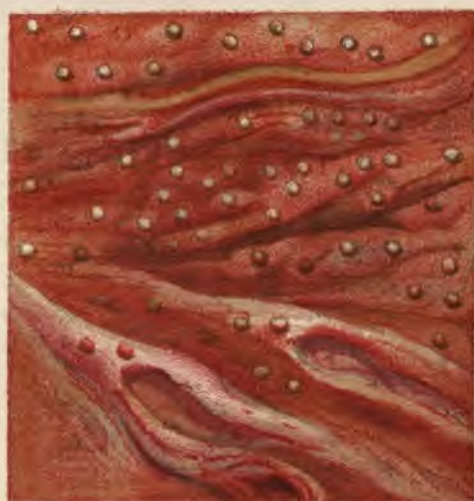


Fig 1.



Appearance of Coecum.

Fig 2.



Mucous membrane of 4th Stomach.

Plate X
Mucous membrane of bladder.





Fig.



Fig.2.

R. Koster, fecit.

G. Leppan Co. Lith. Albany, N.Y.

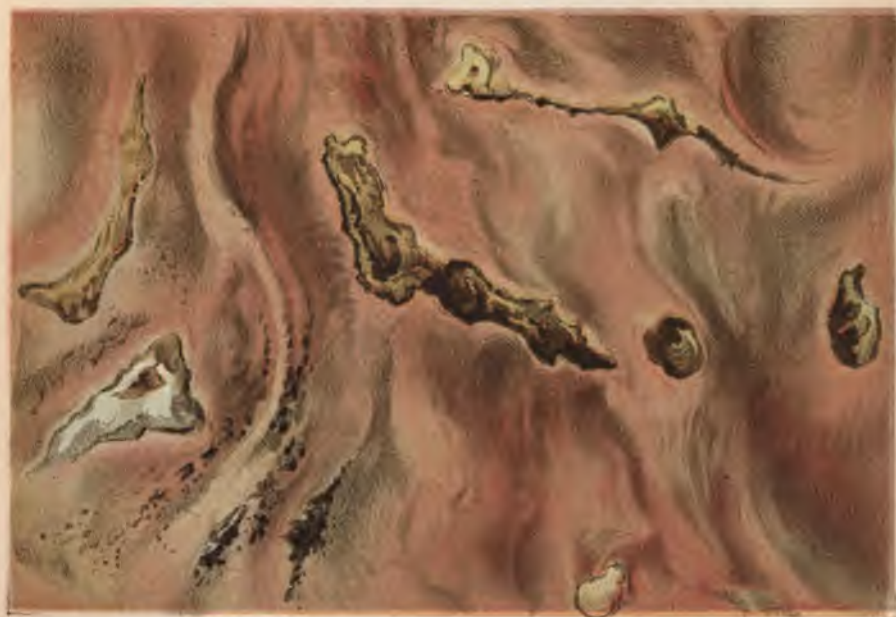
Appearances of Duodenum and Rectum.





Appearance of 3rd and 4th Stomachs,
in the beginning of the acute stage. See plate I. Fig. 2.



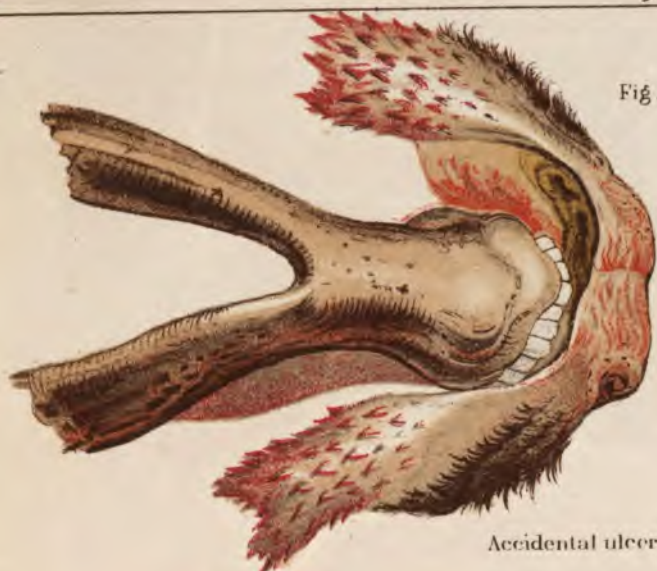


H. Koechler, fecit.

Sections of Abomasum,
"showing congestion and sloughing"

Ampl. Co. Lith. 825-449 11.7

Fig. 1.



Accidental ulcer on lip.

Fig. 2



Mucous membrane of rectum

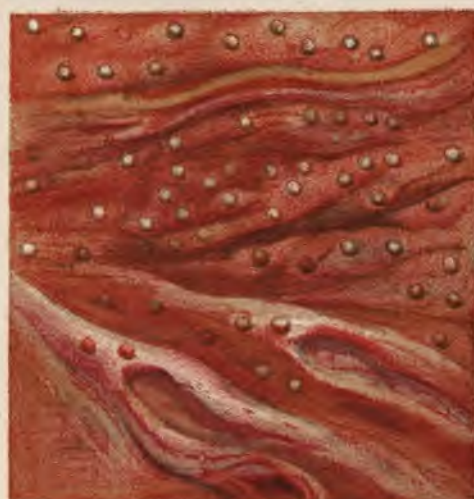


Fig 1.



Appearance of Coecum.

Fig 2.



Mucous membrane of 4th Stomach.

Fig 1



Fig. 2.



Fig. 3



Fig. 6.



Fig. 4.



Fig 5



W. A. B. 1871

Sections of Mucous Membrane
in acute stage from different organs

Angus C. C. 1871

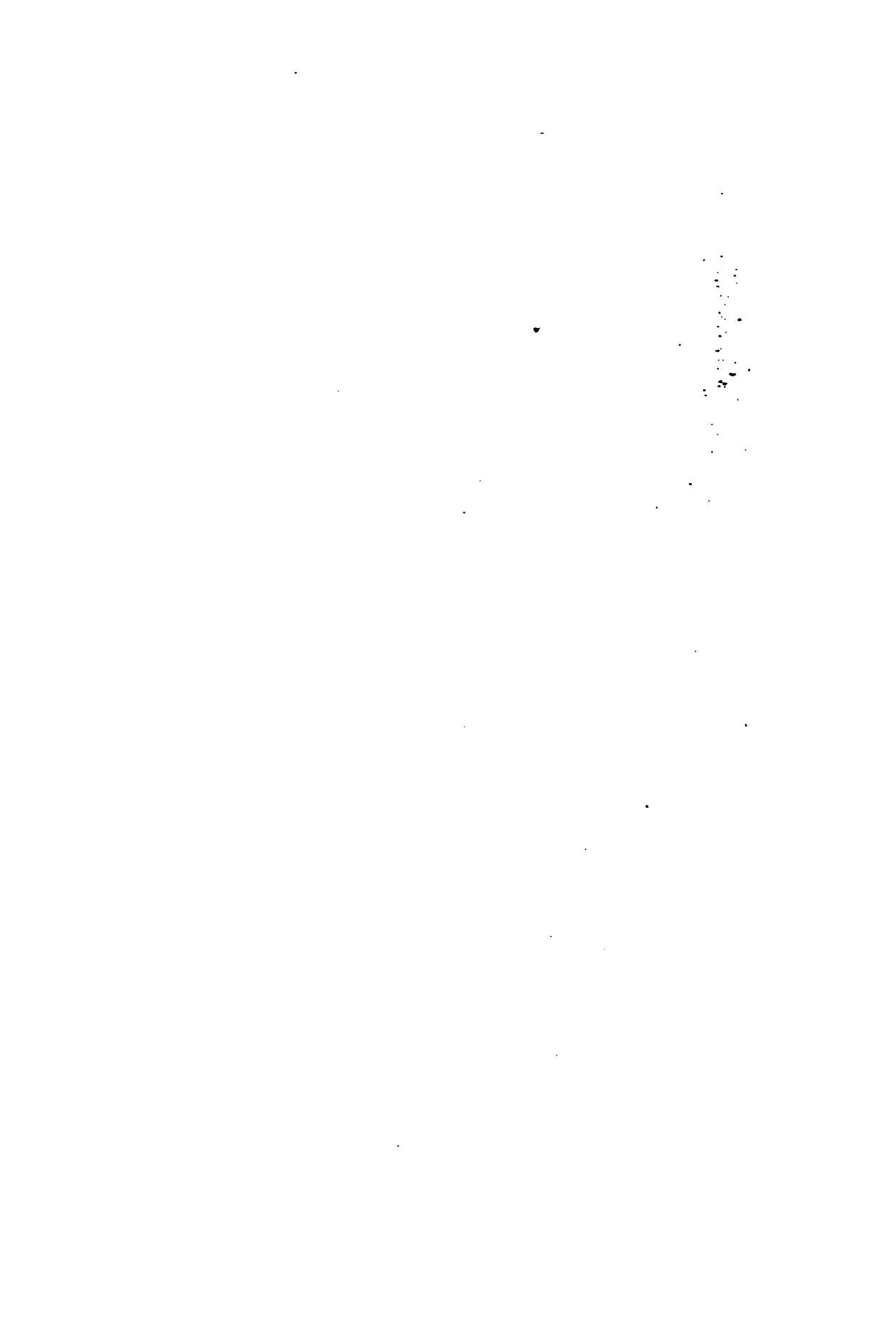


Fig. 1

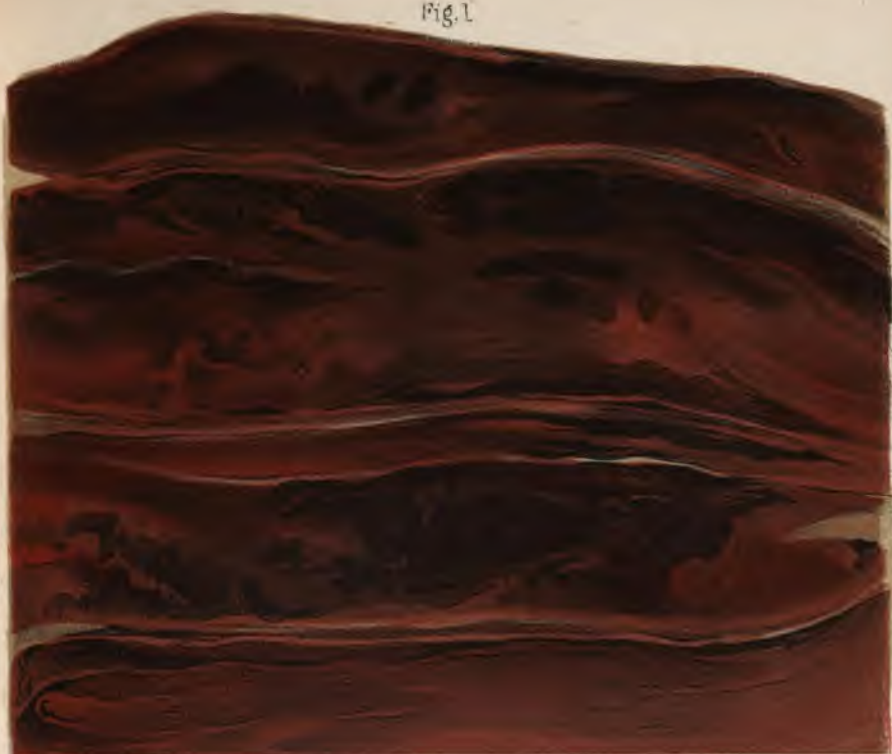


Fig. 2.



W. C. C. C. C.

Argus Co. Inc. Albany, N.Y.

Folds of Abomasum,
(Texas Steers)

Fig. 1.

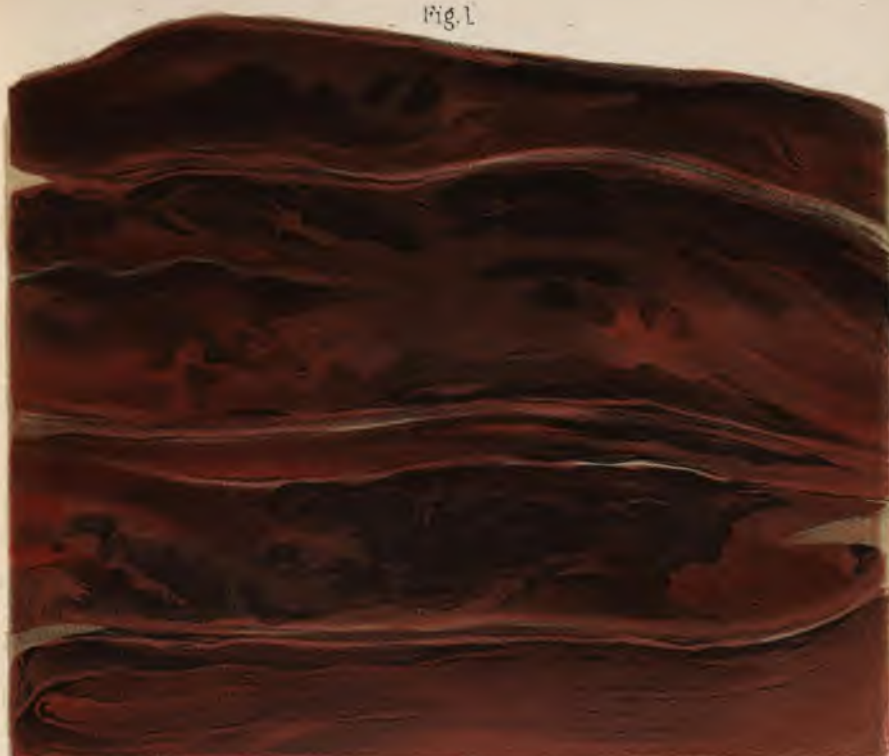


Fig. 2.



Folds of Abomasum,
(Texas Steers)

August 11, 1886. Albany, N.Y.

1000

1000



Fig. 2



Fig. 1



Fig. 3

R. Koehler, fecit.

Fig. 1 Spleen, weight 5 1/2 lbs. Fig. 2 Section of surface of cement reduced Fig. 3 Section of Pulley



Mucous membrane of small intestine

Fig 1



Fig 2.



Fig. 4.



Fig. 3



Fig. 6.



Fig 5



T. B. 1850, 1851

Sections of Mucous Membrane
in acute stage from different organs

Figures on 126: Albany N.Y.



Liver and Gall Bladder,
(weight, 18½ lbs.)



Abomasum one week convalescent



Fig. 2.

Fig. 1.



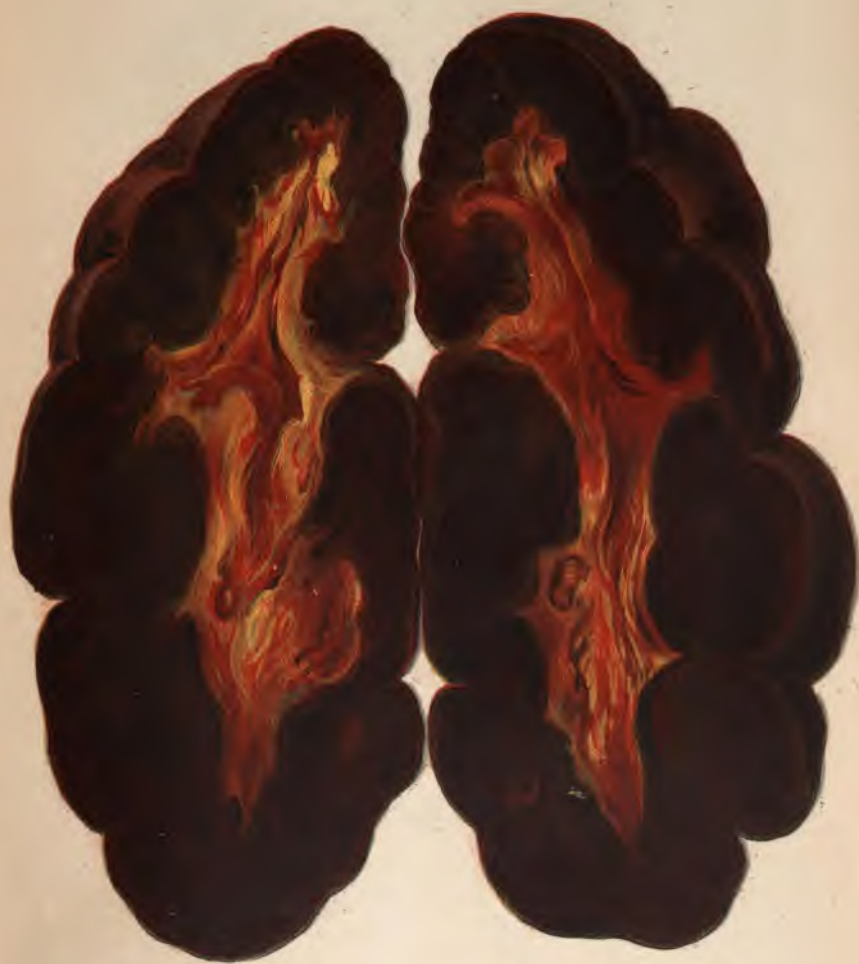
Fig. 3.



Dr. H. H. H. H. H.

Fig. 1. Co. 10. 12. 13. 14.

Fig. 1. Spleen, weight, 5 1/2 lbs. Fig. 2. Section of surface of same, reduced. Fig. 3. Section of same, reduced.



Kidney laid open.
(haemateindine stain, and fat.)



Fig. 1



Fig. 2.

Argus Co. Ltd. Albany, N.Y.

11. Renal, hist.

Fig. 1. Kidney,
(same animal as plate 17)

Fig. 2. Kidney of convalescent,
(one week convalescent.)

Reticulum of Bile-ducts.

4½



5





Fig. 1



Fig. 2.

As of Jan. Co. 12th. Albany, N.Y.

H. Fowler, New York.

Fig. 1. Kidney
(same animal as plate 17)

Fig. 2. Kidney of convalescent,
(one week convalescent.)

Fig. 2

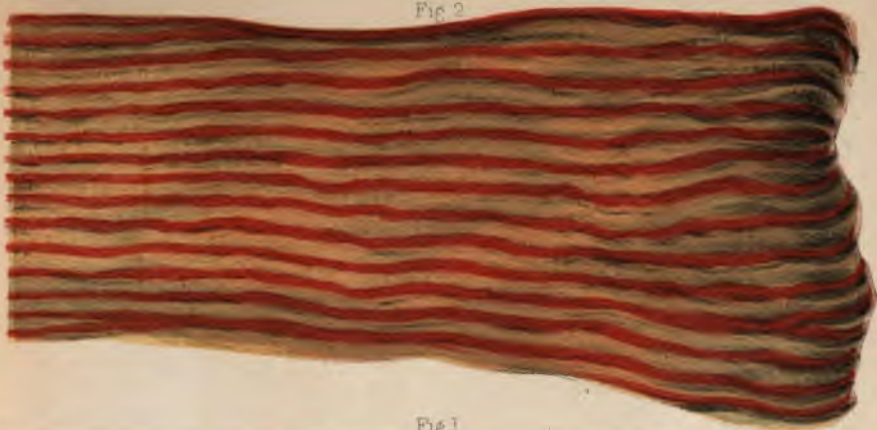


Fig. 1



H. K. Smith, M.D.

Fig. 1. Section of Pyloric portion of Abomasum.
(several weeks convalescent)

Angus C. Smith, M.D.

Fig. 2. Section of Rectum.
(see plate 17)





Abomasum one week convalescent

R. Kohler fecit



Fig. 1.



Fig. 2.

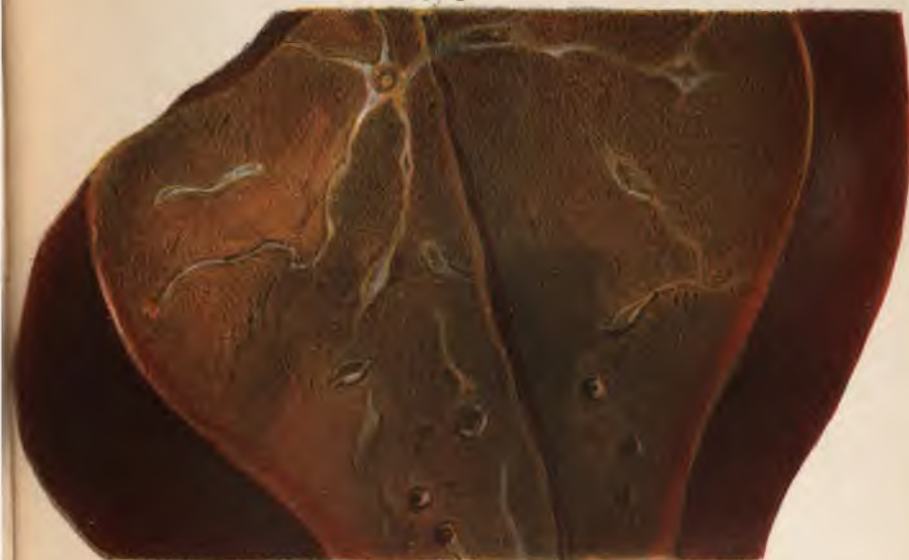


Fig. 3.



Section of Hide, Liver and Spleen,
in Ox several days after acute stage

Angus & Co. Lith. Albany, N.Y.



Fig. 2

Fig. 1



Fig. 3.



H. Koehler, fecit.

Fig. 1. Spleen, weight $5\frac{1}{2}$ lbs. Fig. 2. Section of surface of same in reduced. Fig. 3. Section of

1871-72, No. 126, p. 100, fig. 1-3

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Kidney laid open,
(haematoxyline stain, and fat.)



Fig 1



Fig. 2.

H. Kephler, fecit.

Argus Co. Lith. Albany, N.Y.

Fig 1. Kidney.
(same animal as plate 17.)

Fig 2. Kidney of convalescent,
(one week convalescent.)

Fig 2

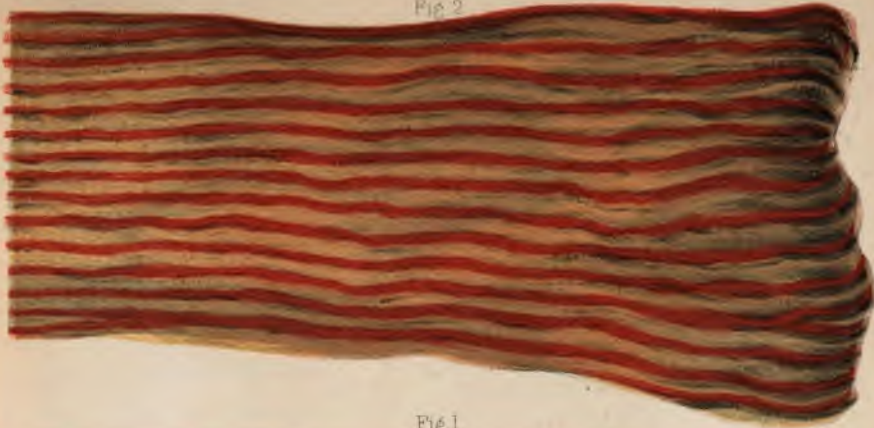


Fig 1



R. Knapp, del.

Fig 1. Section of Pyloric portion of Abomasum.
(several weeks convalescent)

Edwin C. Hall, Albany N.Y.

Fig 2. Section of Rectum.
(see plate 17)

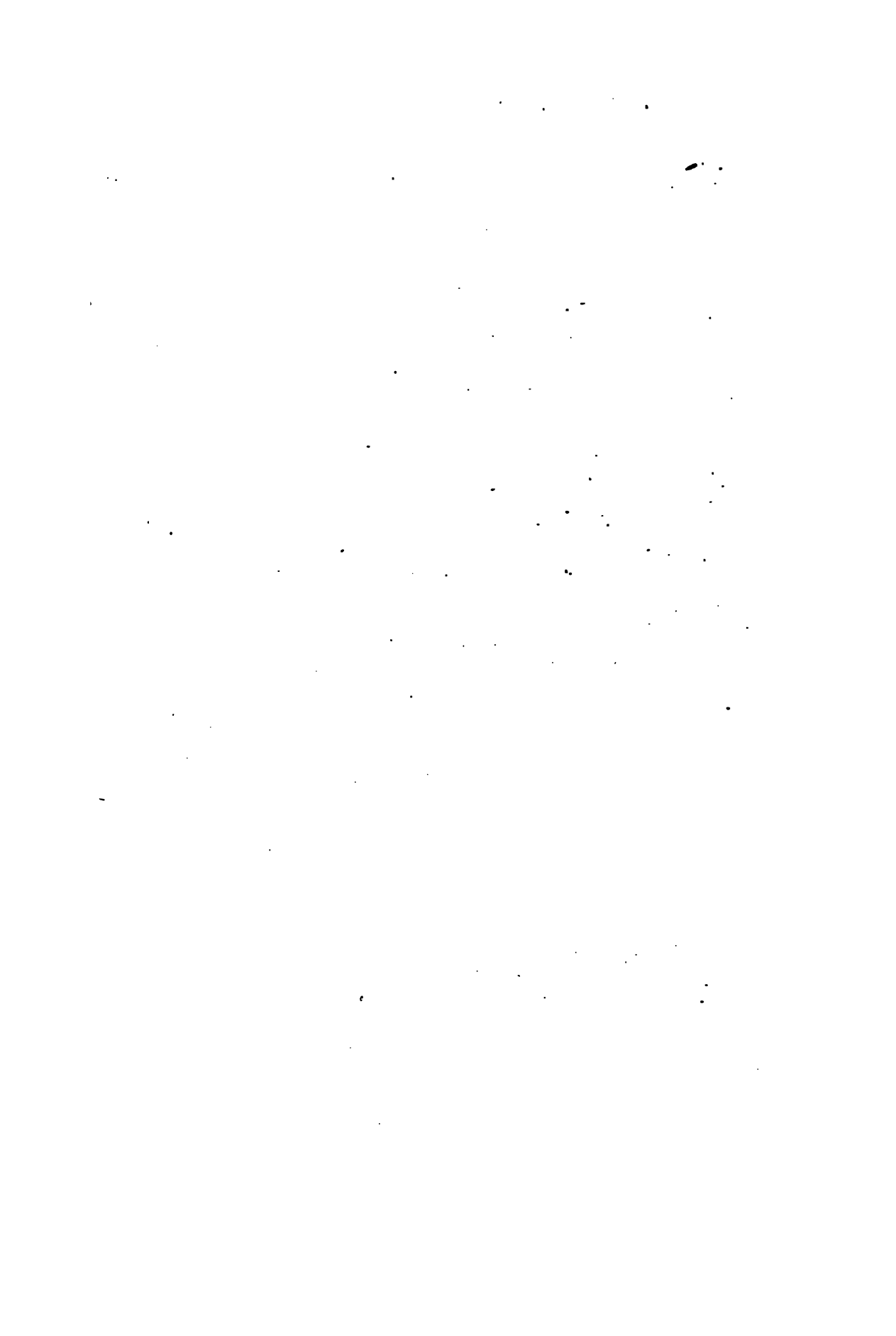


Fig. 2



Fig. 1



R. K. H. H. H. H.

Fig. 1. Section of Pyloric portion of Abomasum,
(several weeks convalescent)

R. K. H. H. H. H.

Fig. 2. Section of Rectum,
(see plate 12)





Abomasum one week convalescent.

R. Kohler, fecit

Fig 2

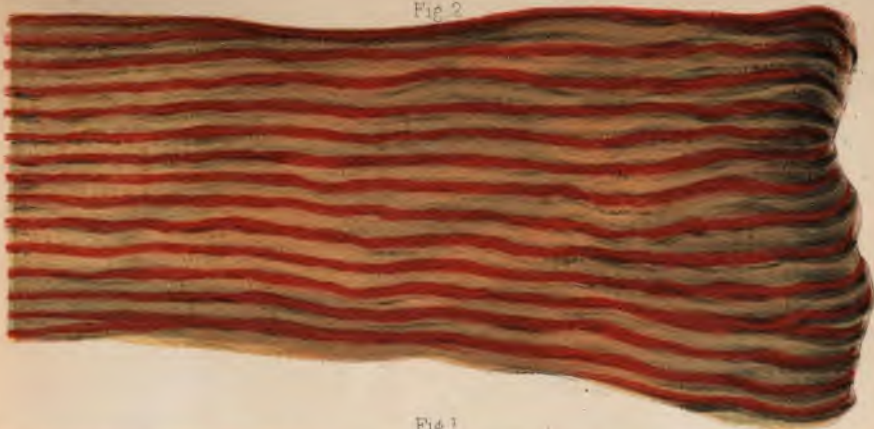


Fig 1



J. K. Kinsler, M.D.

Fig 1. Section of Pyloric portion of Abomasum.
(several weeks convalescent)

Fig 2. Section of Rectum.
(see plate II)

Angelo C. Smith, M.D.





Abomasum one week convalescent

R. Köhler, fecit





Abomasum one week convalescent

R. Köhler fecit



Urine and Liver.

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4



Liver and Kidney.

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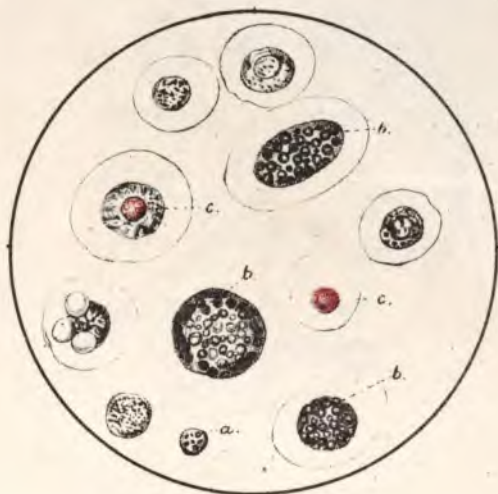
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Spleen of disease & convalescence

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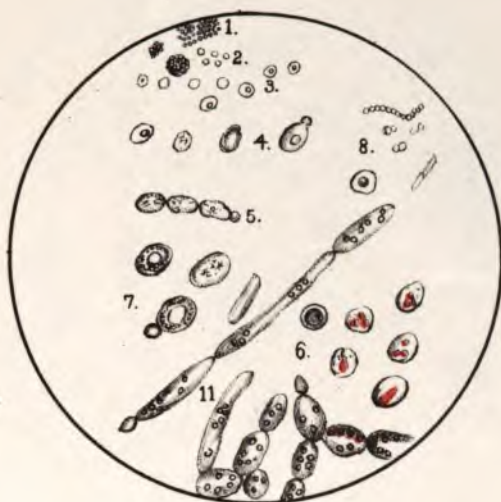
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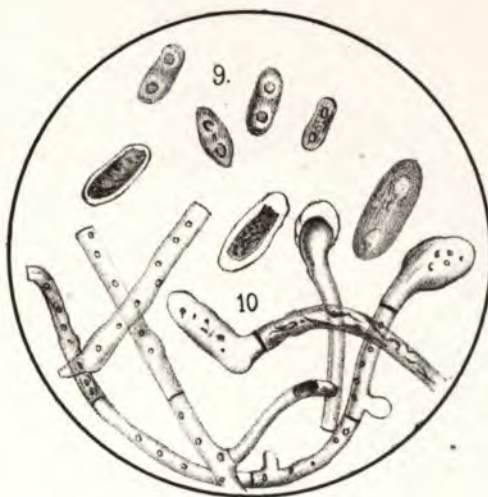


Micrococcus of Bile.

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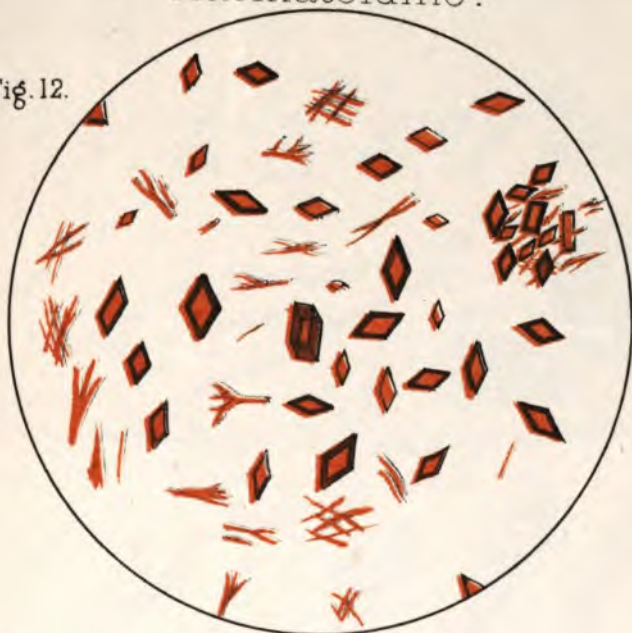


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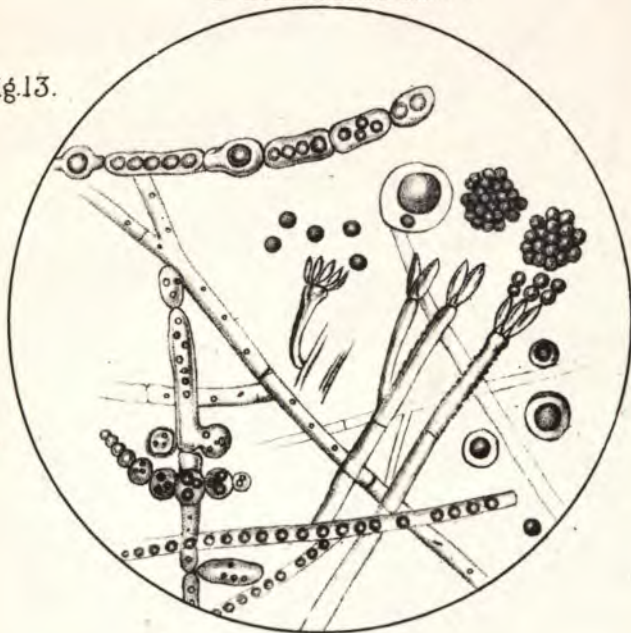
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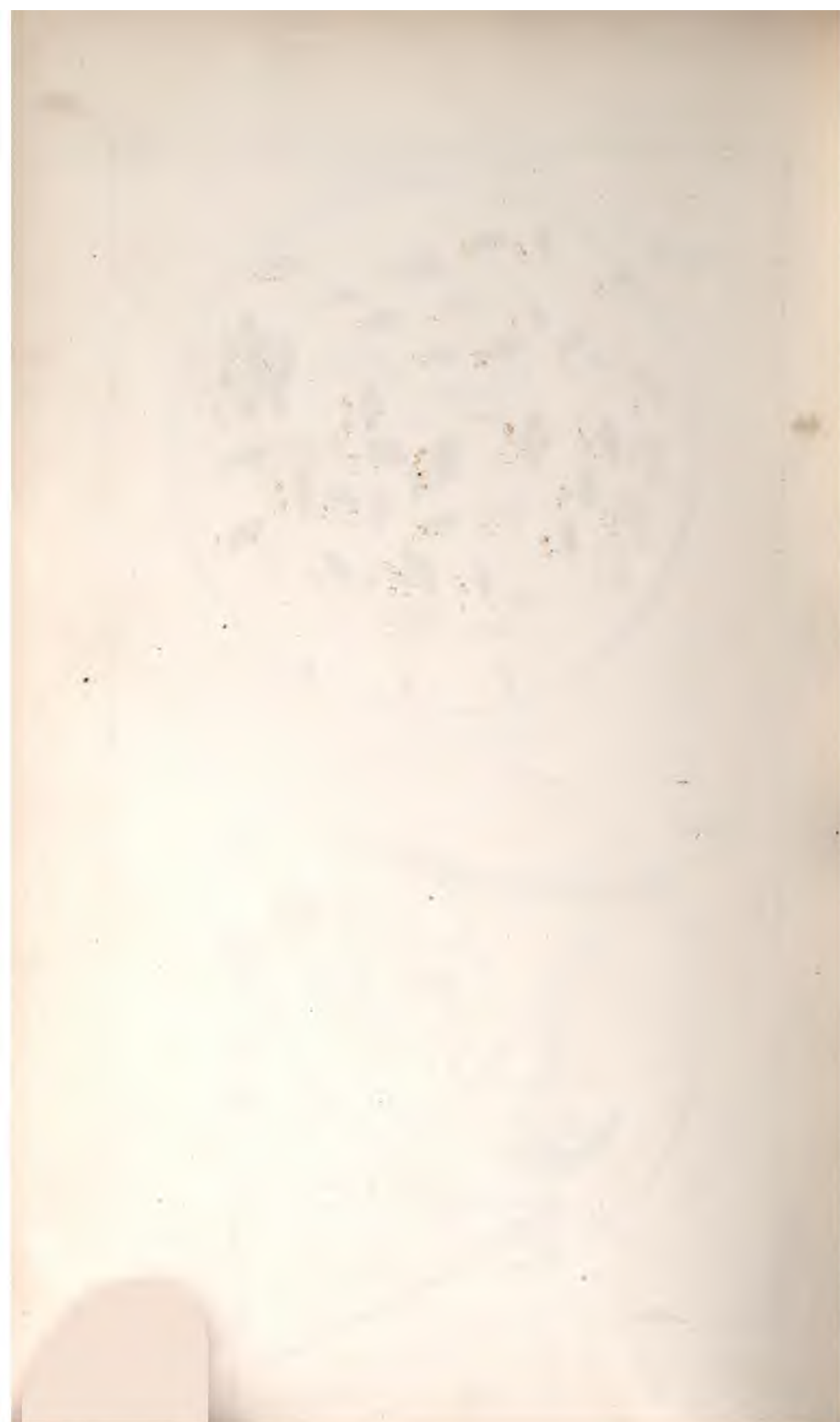
Fig.12.



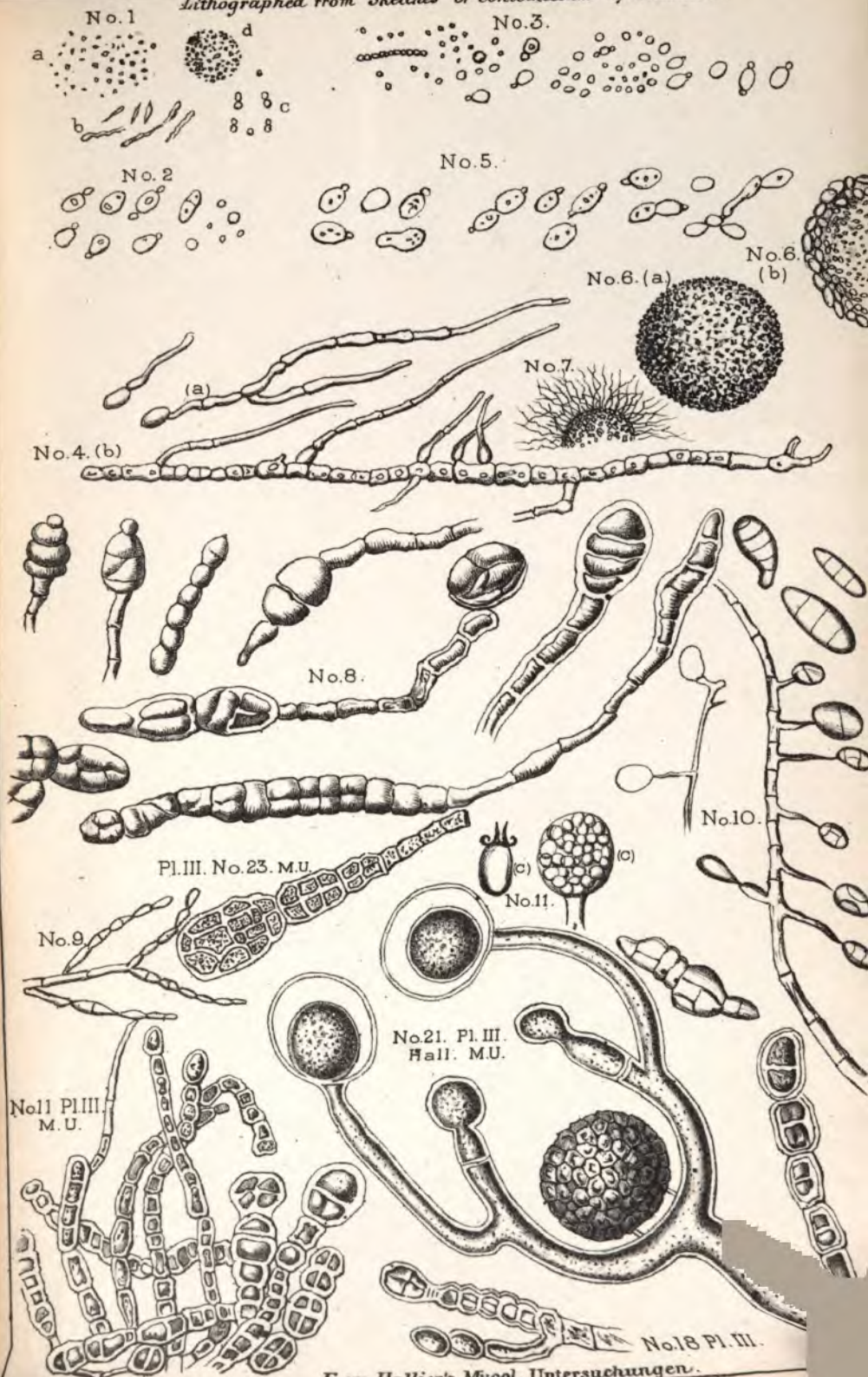
Penicillium.

Fig.13.





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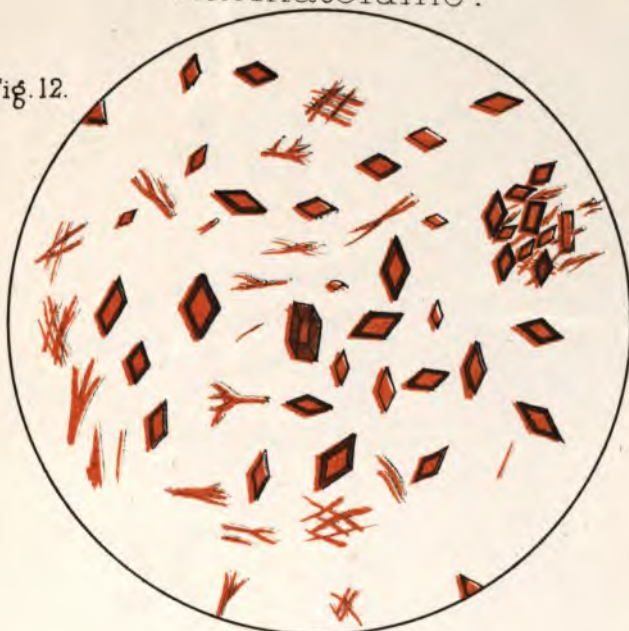




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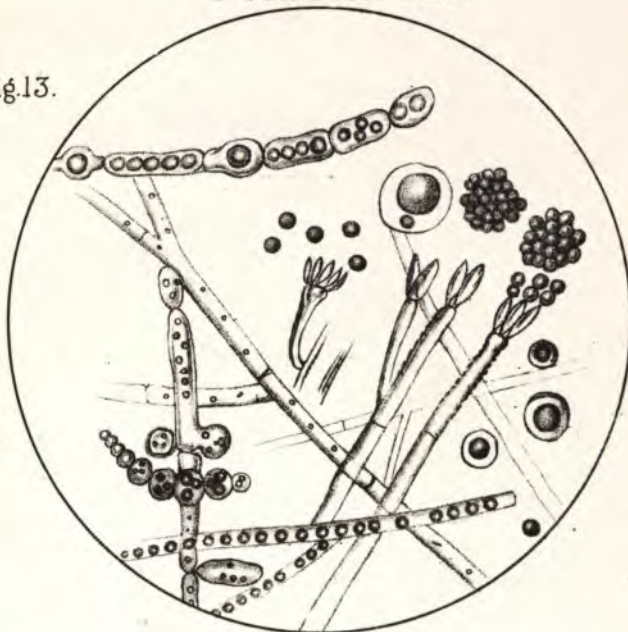
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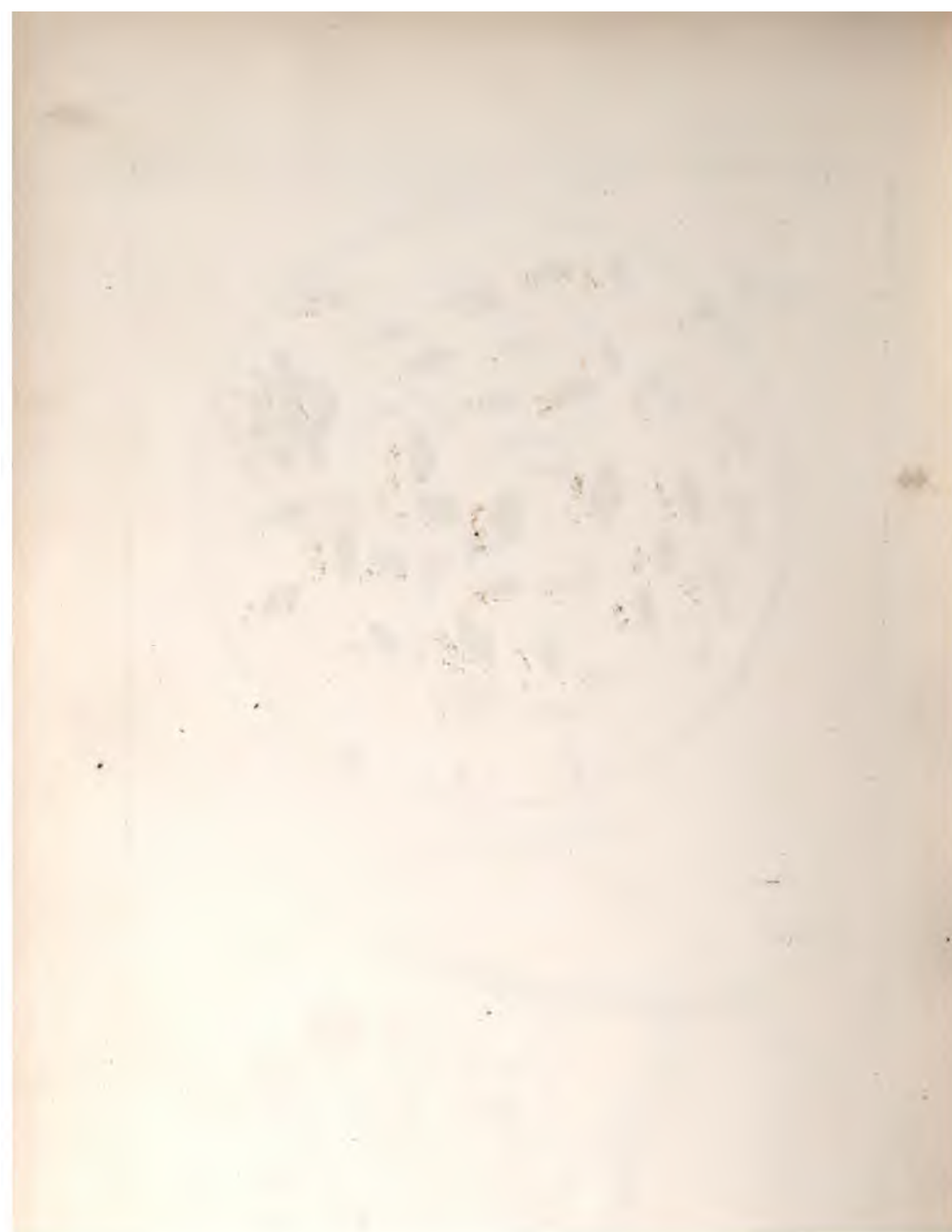
Fig.12.



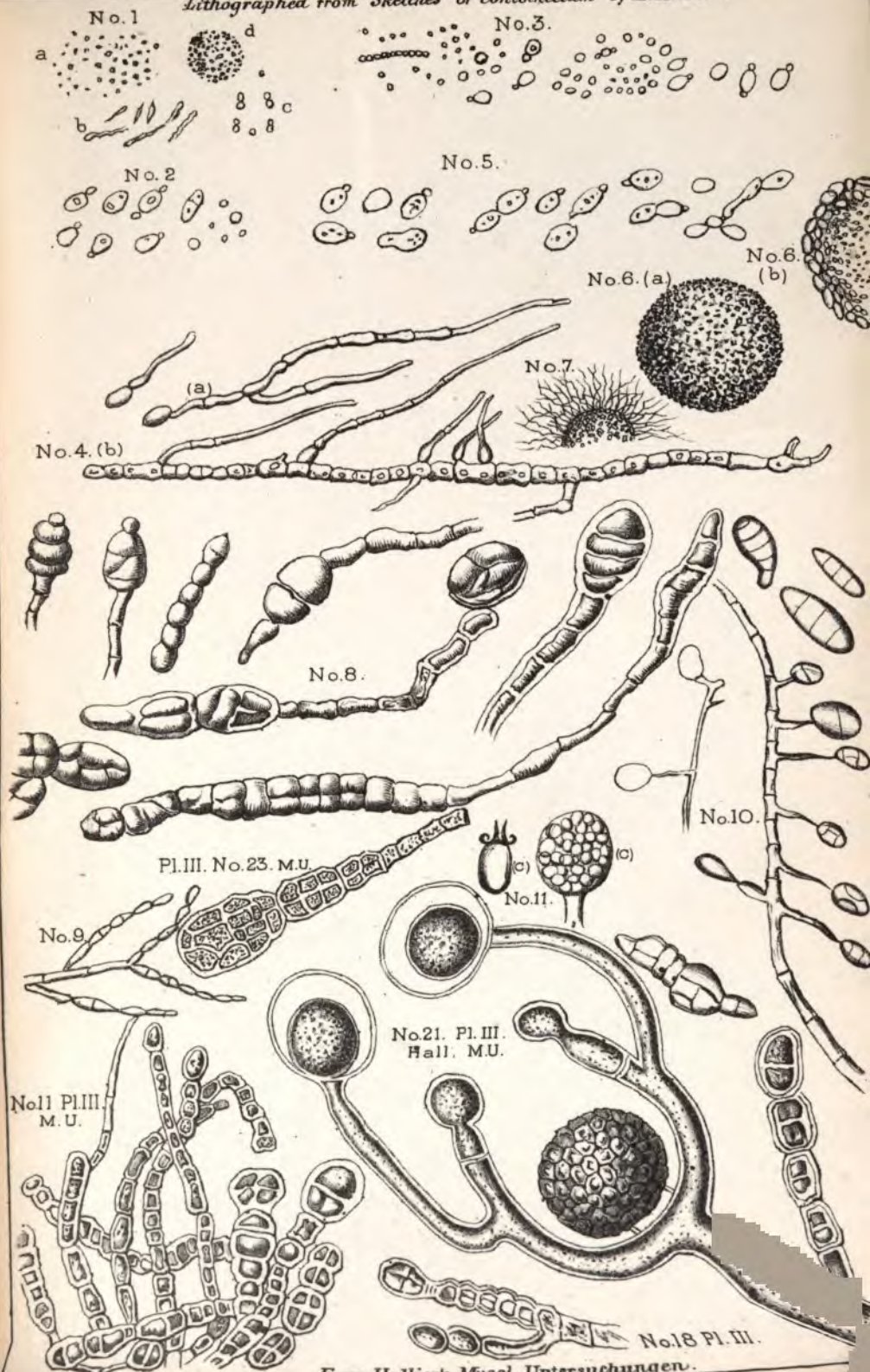
Penicillium.

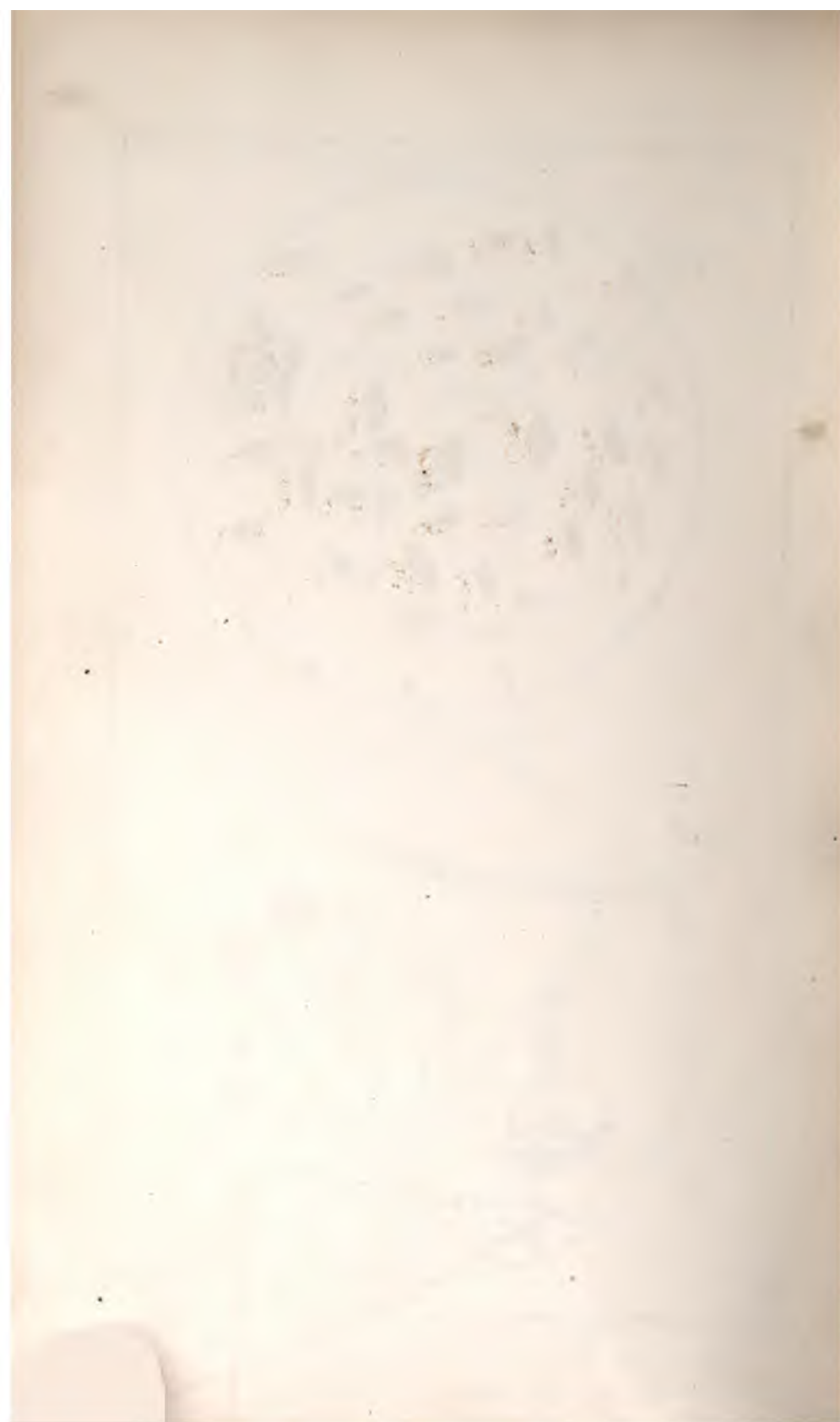
Fig.13.



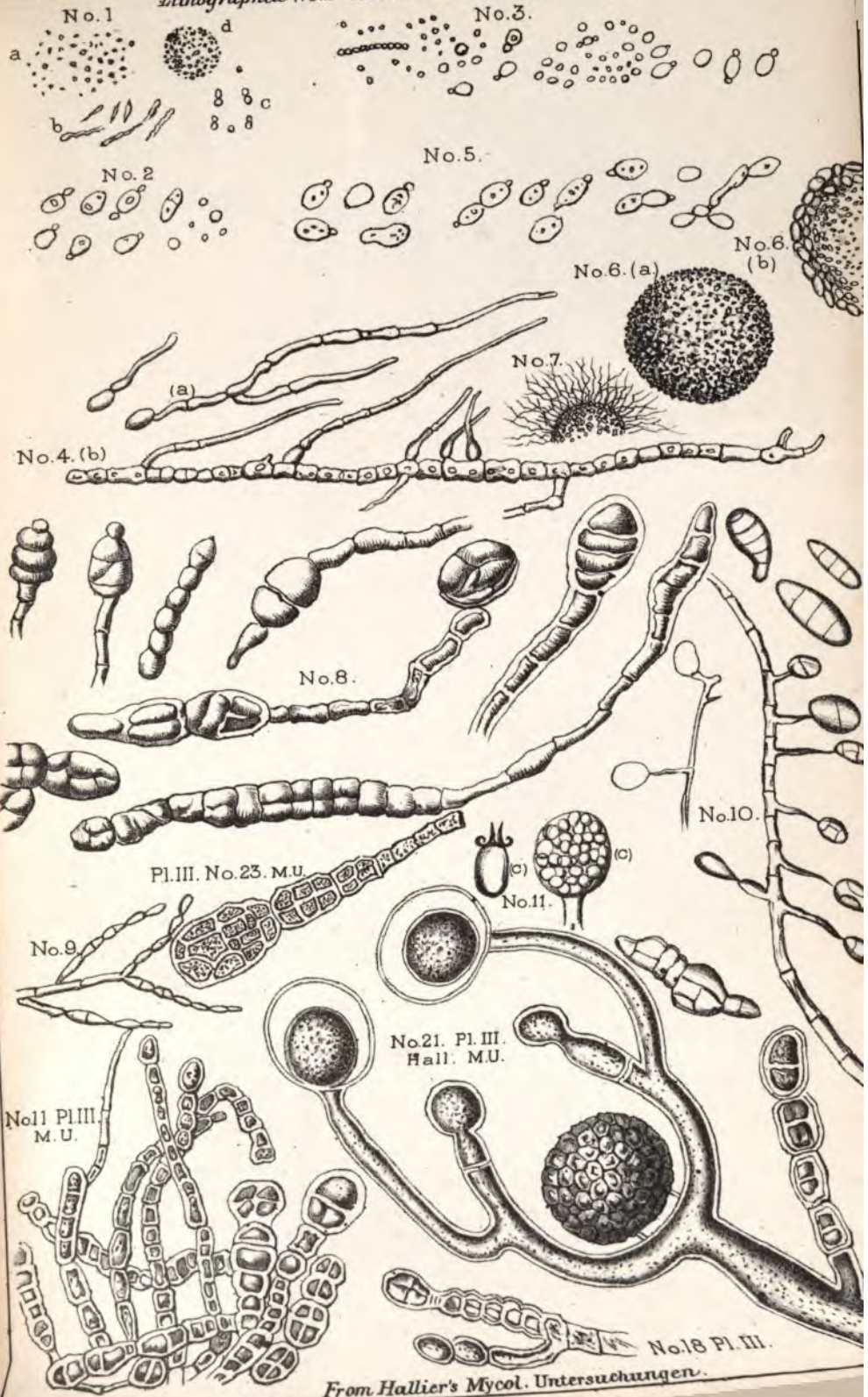


Lithographed from Sketches of Coniothecium by E. Hallier.





Lithographed from Sketches of Coniothecium by E. Hallier.



Spleen of disease & convalescence

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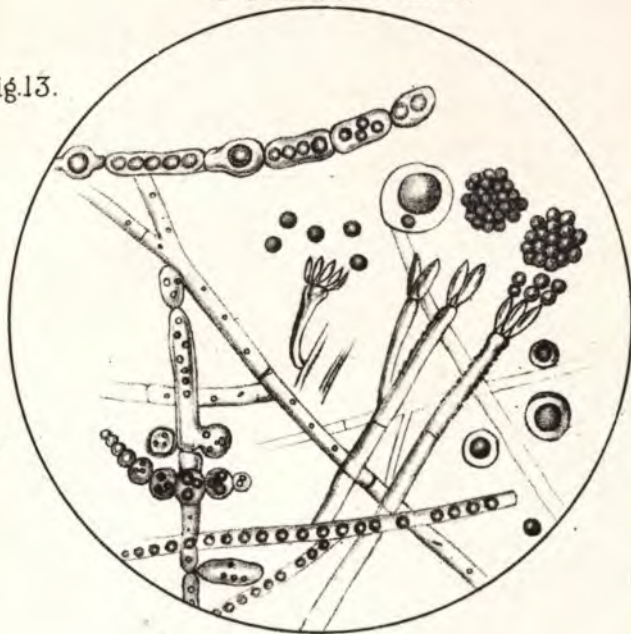
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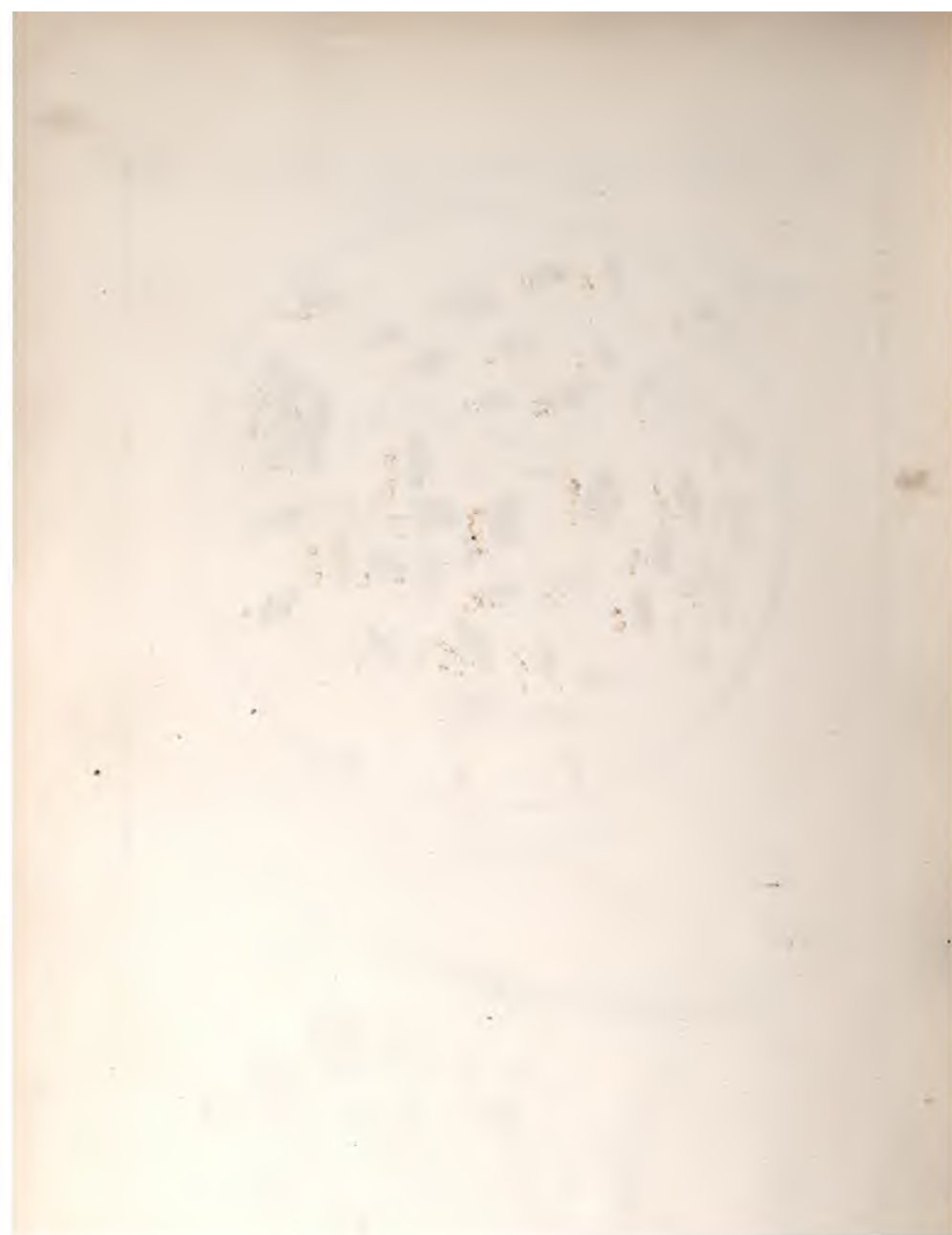
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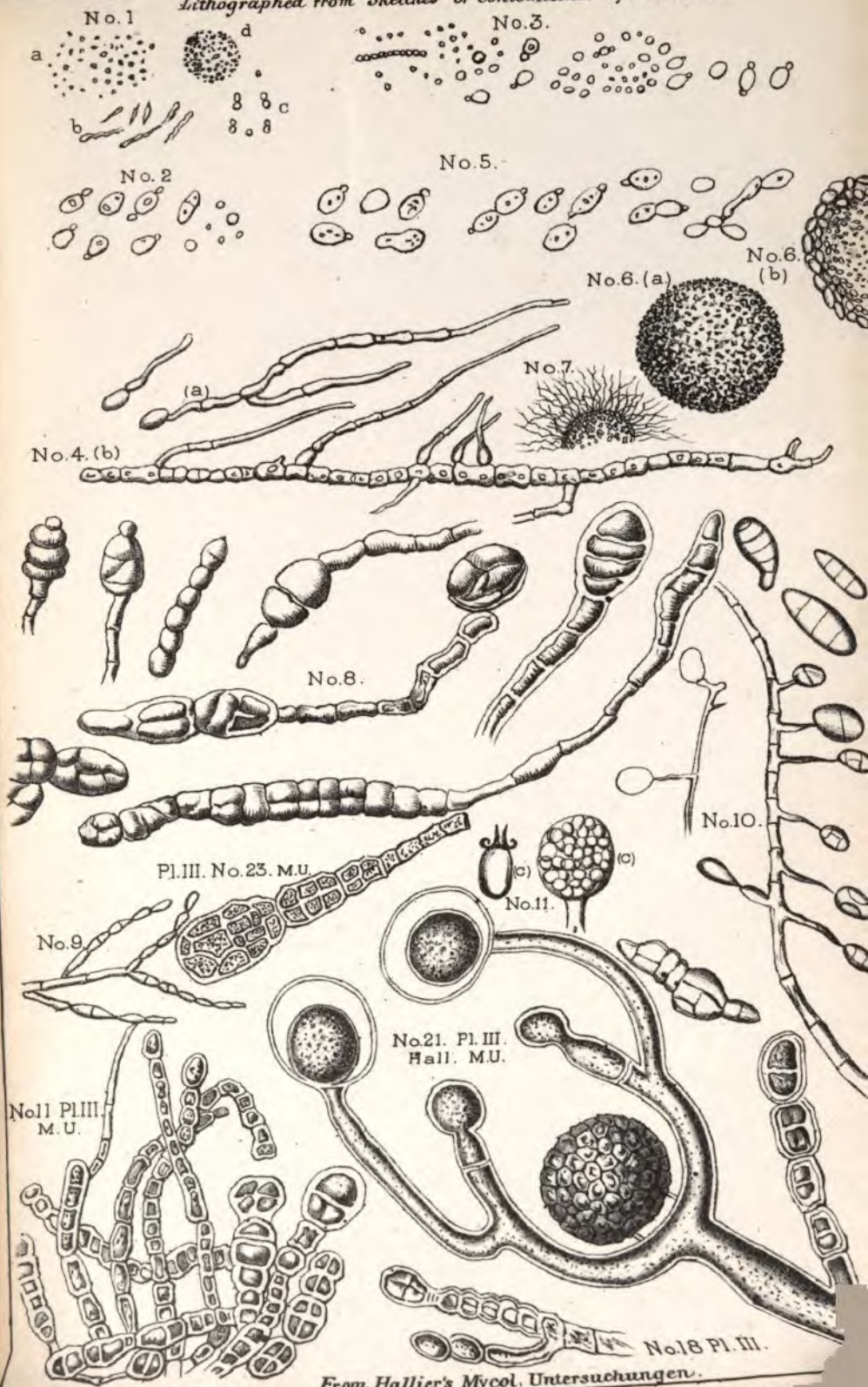
Penicillium.

Fig.13.





Lithographed from Sketches of Coniothecium by E. Hallier.



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